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The Logic of Appropriability: From Schumpeter to Arrow to Teece

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Abstract

This note expounds the abstract fundamentals of the appropriability problem, re-assessing insights from three classic contributions – those of Schumpeter, Arrow and Teece. Whereas the first two contributions were explicitly concerned with the implications of appropriability for society at large, Teece's main concern was with practical questions of business strategy and economic organization. This note argues that, his practical concerns notwithstanding, Teece contributed, *en passant* but fundamentally, to the clarification of basic questions that previous authors had addressed less comprehensively and less satisfactorily. Specifically, his analysis of the innovator's access to complementary assets, undertaken from a contracting perspective, can be seen as filling a significant gap in the previous theoretical discussion of appropriability.

Key words: Appropriability, innovation, complementary assets, patents, intellectual property.

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The greatest homage that can be paid to a scholarly contribution is, in my view, the reader's private acknowledgment that *the world looked different to me* after I read that. When I write, I hope to achieve such a result in at least a few readers – or at least this is so when I am in a particularly ambitious and optimistic mood. I suspect that the well-justified fame of David Teece's 1986 article in *Research Policy* is attributable to the fact that *a great many readers* had such a reaction, recognizing the change the article produced in their basic perceptions.

In this instance, the transformation of my own perceptions actually pre-dated the publication that we now celebrate. It was not reading, but hearing, David's paper that worked the transformation. The occasion was the famous Venice Innovation Conference of March 1986, organized by the young Giovanni Dosi. I recall that scene very well. I recall the sloshing of the canal waters against the walls of the old church in which we met. I recall delighting in the insight that the sound of sharply reversed engines and churning water (accompanied by angry shouts) was the urban-aquatic equivalent of screeching brakes (and angry shouts). I recall the powerful sense of illumination from David's remarks. And I recall Dick Nelson's opening line as he began his discussion of David's paper: "I think we can all agree that we have just heard a very important paper."

For this brief celebratory note, I have limited objectives. Reverting to my one-time role as a teacher of microeconomic theory, I seek mainly to expound in a straightforward way

the abstract fundamentals of the appropriability problem, re-assessing insights from three classic contributions – those of Schumpeter, Arrow and Teece. The first two contributions were explicitly concerned with the implications of appropriability for society at large, whereas such a concern is largely implicit in Teece – but it is not hard to detect that he considers society to be generally well-served by innovative, profitable business firms.

Joseph Schumpeter

Schumpeter framed the appropriability problem in *Capitalism, Socialism and Democracy* (Schumpeter 1950) by sharply highlighting the apparent contradiction between perfect competition and the historical progressiveness of the capitalist system, i.e., its innovative performance. Only some departure from perfect competition can afford the innovator the opportunity to appropriate some of the gains of the innovation.

> "The introduction of new methods of production and new commodities is hardly conceivable with perfect – and perfectly prompt – competition from the start. And this means that the bulk of what we call economic progress is incompatible with it. As a matter of fact, perfect competition is and always has been temporarily suspended whenever anything new is being introduced – automatically or by measures devised for the purpose – even in otherwise perfectly competitive conditions." ((Schumpeter 1950), p. 105).

What lies behind "hardly conceivable"? Presumably, the judgment that innovation is ordinarily the fruit of prior innovative effort, voluntarily directed to the end of bringing it about. Such effort is costly, involving at a minimum the time and attention devoted by the innovator, and the incurring of these costs must be motivated if the innovation is to occur. And why the studied qualification "and perfectly prompt?" Because any interval of time Δt in which the innovator can receive price P for production that costs $c < P$ provides a return $(P-c)\,\Delta t$ to the innovator that might conceivably cover the costs of the

innovation. The role of "perfectly prompt" is thus to exclude lead-time as a mechanism of appropriability for the innovator. Lead-time is often complemented by a dose of secrecy, which can preclude the possibility that imitating rivals run virtually abreast of the innovator in the race to get to the market.

On reflection, we see that Schumpeter's artful construction here makes it easy to miss the fact that his "perfectly prompt" substantially undercuts the force of his "hardly conceivable." Actually, it is very conceivable that a realistically competitive situation affords adequate incentives for *some* level of innovation, because "perfectly prompt" is not a realistic feature. Needless to say, the larger the gap one concedes between the sort of competition encountered in practice and the theoretical ideal, the more room one tends to make available in which innovators might find ways to appropriate gains. The realistic and significant issue is *how much and what sort* of innovative effort gets past the incentive screen, and what does the level of *ex ante* uncertainty have to do with that question?

In short, it is only a theorist's super-stylized version of a competitive market system that is strictly incompatible with all innovation incentives. That limited observation, offered from the lofty heights of theory, is nevertheless a very powerful one. Schumpeter's rich discussion contains a number of complementary insights on the sorts of protections innovation requires, and the short and long run consequences of those protections for the system. He emphasized, of course, the role of large-scale enterprise: "As soon as we go into details and inquire into the individual items in which progress was most conspicuous, the trail leads not to the doors of those firms that work under conditions of comparatively free competition, but precisely to the doors of the large concerns …." (p. 82). On the

question of *what it was* about large scale that made the difference, he was fecund and provocative but less than clear. He touched upon the fact that some innovations are themselves indivisible and also on the fact that the innovating firm must be sturdy enough to carry the financial risks involved.

Overall, Schumpeter's argument led him to conclude that "… perfect competition is not only impossible but inferior, and has no title to being set up as a model of ideal efficiency." (p. 106). (Well, maybe we should concede a claim to ideal *static* efficiency.)

Kenneth Arrow

In his classic 1962 paper (Arrow 1962), Arrow juxtaposed a fundamental conceptual discussion of the economics of information with a model of innovation incentives.[1] The model is a relatively simple one in terms of the analytical apparatus employed,[2] but has a substantial subtlety that derives both from the broader conceptual discussion on which it rests, and from a more specific advance in the conceptualization of the appropriability problem.

The broader discussion shows how the fundamental properties of information make it a highly problematic case for the linkage between the efficient allocation of resources and competitive markets. In particular, Arrow's "fundamental paradox" points out that when

[1] The problem was actually posed in terms of incentives to *invent*, possibly because the paper was originally presented to a conference on the economics of invention, and I will now generally adhere to this terminology in discussing Arrow. Actually, the analysis could relate to either invention or innovation. On the innovation interpretation, it assumes that the invention is in hand but there are additional one-time costs of innovating. The assumption that these costs can be accurately foreseen may actually be somewhat more plausible than the corresponding assumption about invention.

[2] A substantial theoretical literature subsequently emerged, which embedded Arrow's version of the incentive question in various more complex settings. An early example was Dasgupta, P. and J. Stiglitz (1980). "Uncertainty, industrial structure, and the speed of R&D." The Bell Journal of Economics **11**(1): 1-28..

information itself is the commodity being transacted, there is a clear tension if not an outright contradiction between the (usual) assumption that the buyer knows what she is paying for and the assumption that she is willing to pay for it. If the buyer already knows, why would she want to pay to get the same thing again? It is the fact that it is indeed "the same thing again" that reflects the distinctive properties of information; the incremental value of second receipt of the same information is presumptively zero since the first receipt can provide all desired service. These market failure problems in the market for information, highlighted by Arrow, remain an important contemporary theme both in theory and practice.

In the specific foundations of his model, Arrow simply set aside the appropriability problem that he had just illuminated by his conceptual discussion. Implicitly, he posited a perfect property right in the information underlying a specific productive technique, which is relevant to a single industry. The property right can be interpreted as an ideal patent – unambiguous, costlessly enforceable, and of infinite duration.[3] Further, the availability of this protection and the production cost implications of the information involved are evidently fully known to the inventor *ex ante*, before the inventive effort has been exerted. The focus is on the incentive to invent – the gross return the inventor can capture. The size of that incentive will determine whether the inventor can realize a net return from making the invention, and therefore, also, whether the invention will in fact be made.

[3] The model was actually formulated in static or single-period terms. However, the costs of the invention are once-and-for-all and the returns are presumably flows of some duration. Hence (I tell the students), there is a units problem lurking here. The simplest way to deal with it is to assume the flows are constants and take present values to infinity.

What this framework permits is a clear separation of the aspects of the appropriability problem associated with the protection of the information itself -- which is assumed to be assured by the ideal patent – and the aspects that are intertwined with the context of use of the invention. In particular, consider the context of an industry facing a downward-sloping demand curve, and in which production is occurring at the constant unit costs made possible by some existing technique that is freely available to the industry. If the inventor comes up with a technique that permits production at a lower cost, there is clearly a potential for social benefit. This might take various forms and could accrue to the inventor, to consumers of the product, or perhaps to owners of firms in the industry. If the inventor can appropriate a portion of the benefits that exceeds his costs of invention, that will provide the incentive to make the invention, and a net social benefit will likely ensue.

The principal focus of Arrow's analysis was on the way the pre-invention structure of the output market affects the possible gains from the invention. The most straightforward version of the argument is simply that competitive output is larger than (simple) monopoly output, for familiar textbook reasons. Hence, a given amount of unit cost reduction is more valuable if the industry is initially competitive.[4] Protected by his perfect patent, the inventor can simply license the invention to the industry on uniform terms, a per-unit royalty representing all but a trivial portion of the cost savings that the invention makes possible. Output does not change, and society foregoes the portion of the potential benefit that would be attainable by increasing production at the new level of marginal cost.

[4] As Arrow shows, the approximation provided by this simple story tends to perfection as the cost reduction gets smaller. In the interest of brevity, I do not address Arrow's analysis of the opposite case, a"radical" invention that implies a new monopoly price below the old competitive price.

Superficially, the same analysis would seem to apply to the monopoly case, with the only difference being that the monopoly output is lower. This is not the case, however. The inventor could presumably make an all-or-nothing deal with the monopolist, which is difficult to arrange for a competitive industry. Such a deal could, at the extreme, yield to the inventor the full increment of monopoly profit that the invention makes possible, an amount that exceeds the cost reduction on the pre-invention monopoly output by the profit (at the new cost) on the increment of monopoly output. This total "monopoly incentive" for the inventor is, as Arrow shows, still less than the competitive incentive previously analyzed.

There is another issue lurking here, one that prefigures the analysis in Teece (1986), but which Arrow skillfully sidestepped. The actual assumption in Arrow's monopoly case is that only the monopolist is capable of the invention, so monopolist and inventor are one and the same. This summarily dispatches the problem of how the gains would be shared between the monopolist and an outside inventor -- which is a simple case of the complementary assets problem that Teece subsequently addressed. It is, of course, far from obvious that an outside inventor would generally have the bargaining power needed to assure appropriation of all the gross returns. If, however, the question is simply the adequacy of the incentives to make this particular invention (Arrow's concern), then it does follow that when this question is close, the monopolist has the (small) incentive to concede approximately all the gross returns in order to get the deal done. On a broader interpretation – e.g. if inventors look to typical or analogous returns in deciding how much effort to put into a particular (uncertain) case – the prospect of sharing the returns

from a big winner with an incumbent monopolist will certainly diminish the incentives facing an independent inventor.

Arrow, like Schumpeter, was generally disposed to the view that the market system had intrinsic limitations in dealing with innovation, hence that incentives to invent might be inadequate from a social welfare standpoint, and that the amount of progress produced might be sub-optimal. Here I put the optimality issues aside and consider how a simple elaboration of the analysis provides a perspective on the question of *how much* innovation happens. Suppose the economy faces a population of independent invention opportunities of the Arrow type. Pursuing a particular opportunity involves costs C_i. When the inventor pursues appropriability strategy j, the realized total benefit is V_{ij}, and the inventor appropriates $S_{ij} V_{ij}$, leaving a benefit of $(1 - S_{ij}) V_{ij}$ for the remainder of society. Assuming the accurate *ex ante* comparison of private costs and benefits for the inventor, the individual invention happens when, for at least one strategy j, the inventor anticipates receiving $S_{ij} V_{ij} > C_i$. Overall inventive activity is the sum of these cases over the population.

Various obvious remarks can be made on the basis of numerical examples constructed within this simple scheme, including ones supporting the tradition of "desirable inventions might not get made, for want of an adequate appropriability strategy." On the other hand, there are the examples where the invention does get done, notwithstanding the fact that the relevant S_{ij} is much smaller than one. In fact, there are hypothetical worlds where arbitrarily large fractions of the potential net social gains are successfully realized, simply because the appropriability test is easy to pass when the C_i values are small and some of the V_{ij} values are very large, and the population of opportunities

contains a high proportion of such cases. That inventors get a small fraction of the realized gains in such worlds is relevant to the wealth of the inventive class (or the assignees of its patents), but not to progress. What is potentially quite relevant to progress, however, is the possibility that the pursuit of a high S_{ij} might motivate the design of strategies with V_{ij} considerably smaller than V_i^*, the hypothetical first-best social benefit that could accrue if the constraint of covering the inventor's costs did not have to be honored.

The less invention depends on effort, the more credibility attaches to the "hypothetical worlds" just referred to. If invention depends minimally on effort but more on insight or happenstance, or if its effort costs are reduced by the direct consumption (or reputational) benefits of "tinkering," invention might abound in spite of low appropriability. But it seems hard to imagine worlds in which *innovation* would prosper similarly, given the investment commitments often involved. Skepticism about the relevance of "effort" in the context of innovation is distinctly harder to maintain.

Arrow announced the conclusion that, if there was something that made monopoly superior to competition in terms of promoting innovation, it must have something to do with appropriability. In a sense, therefore, Arrow followed Schumpeter in suggesting the relevance of market structure to appropriability while not attempting to fully explicate such a relationship.

David Teece

Many features of the Teece paper (Teece 1986), not least its title and its wealth of instructive examples, testify to the fact that this is not an exercise in abstract theory. Rather, Teece sought to illuminate practical issues of business strategy and economic

organization, and his treatment is remarkable for its sophistication, nuance and comprehensiveness. Many of his brief asides would warrant a paper if fully developed. It is certainly not surprising that the paper has been such a rich source of inspiration to others.

My central claim here is that this classic contribution is also very significant and fruitful at a more abstract theoretical level, although I believe that many of these gains still remain uncaptured at this point for want of … well, for want of suitable complementary efforts. Specifically, Teece's discussion of access to complementary assets offers one very helpful way to unpack much previous discussion of links between market structure and innovation. After this unpacking is done, an "obvious" point becomes clearly visible for the first time -- and as so often happens in such cases of key insight, it seems puzzling *ex post* that it could have been missed for so long. Another thing that appears, one that is likely implicated in the oversight, is the fact that the "market structure" framing was actually not very helpful for analytical purposes. Much more helpful is a contracting perspective, which in fact Teece applied to great effect.

The *obvious point* is, there are key issues involving the boundaries of the innovation itself, and these issues have a complex interdependence with the questions of appropriability and strategy. This point was largely missed in the theoretical literature, especially in the more formal part. It was understandably difficult for theorists to resist the temptation to begin (as usual) by stripping away the ontological complexities and posit "an innovation" – a recognizable discrete entity of strictly determinate character. In reality, however, an innovation at its early stages – consisting perhaps of an invention plus some ideas about its application --presents a rich variety of potentials, a set of

options that might be pursued in diverse ways. This range of meaning for what the innovation *is* has much to do with the range of appropriability strategies available to the innovator. Unfortunately, it often seems that when theorists make a sensible decision to repress complexity temporarily for the sake of analytical progress, they often proceed to develop habits of thought that then prove hard to break – and the promise implicit in "temporarily" remains unredeemed. Something like this seems to have affected the theoretical literature of innovation.

Teece's contribution provided a critically important entry point for understanding the rich variety of situations that reality can present. In the nature of the case, such a contribution cannot be summarized in a single sweeping conclusion. As the decision flow charts in his paper indicate, the general conclusion is "it all depends;" and the point and value of the analysis is to explain what it depends on. In what follows here I consider a series of special cases to illustrate general points about the relationship of appropriability to complementary assets.[5]

In the simplest case, an aspiring innovator brings to the economy an innovative concept that can yield its full utility when combined with various other things the economy already contains in precisely the required form. Further, the economy not only "contains" these things but offers them in competitive markets at established prices. It must also be assumed that there prices are "given" in the strong sense that they that would be little affected if the innovation were to be applied at its maximum potential scale. If an innovation is presumed to be based ultimately on non-rivalrous information,

[5] I do not explore here the important connection between the appropriability/complementary assets nexus and another of Teece's conceptual contributions, dynamic capability; see my brief discussion of this in (Winter 2000).

its scale of application is not limited by any scarcity inherent in the innovation itself, and no *a priori* limit can therefore be set to the value transformation that a single innovation works on valuations in the system as a whole.[6] Aside from this last point, the setting posited here so much resembles the familiar theoretical picture of competitive general equilibrium that we might as well call it that.

In this posited setting, the question of the boundaries of the innovation is of no consequence. One could assume at one extreme that the core novelty involved is somehow strictly independent of everything else, e.g., it is a novel process producing a novel product that enters directly into consumer utility functions. Or one could, on the contrary, assume that in order to realize value from the core novelty it is necessary to combine it in complex ways with a number of existing products and services.[7] Under the conditions assumed above, these apparently contrasting cases are fundamentally the same -- because, if access to the required complements is totally non-problematic, it doesn't matter how much of it is required. This is the situation that Teece discusses under the "contractual modes" heading, where "complementary assets are available in competitive supply (i.e., there is adequate capacity and a choice of sources)." (p. 293). The fact that complementary assets do not play a central role does not itself dispatch the question of imitation, i.e., the question of the "appropriability regime."

Arrow's competitive case presumes the quintessential "tight appropriability regime" that Teece discussed, and evidently the complements are either not required at all or are

[6] In other words, while one can conceptualize firms or consumers in ways that make it reasonable to assume that each is "small" relative to the system as a whole, there is no logical basis for assuming *in general* that innovations are small relative to the system.

[7] I use the term "core novelty" in an effort to exempt myself from the afore-mentioned hazards of presuming that the "innovation" is discrete and well-defined before the appropriability problem is addressed.

readily accessed. Arrow's monopoly innovator corresponds similarly to Teece's brief treatment of the case where "the innovator is already a large enterprise with many of the relevant complementary assets under its control." (p. 295). Here the complementary asset position is critical, but is almost automatically sufficient to assure appropriability. Legal protection for intellectual property is in this context redundant.

In my work with Richard Nelson, we used simulation methods to examine returns to innovative R&D under various specifications of an industry under conditions of Schumpeterian competition (Nelson and Winter 1982; Nelson and Winter 1982). The critical assumption of our analysis – our interpretation of what Schumpeter meant or should have meant in his remarks on the large enterprise – was that the innovator could apply new, lower-cost production methods across his existing capacity, and might (or might not) be able to forestall imitation by others. This assumption provides a perspective on innovation in imperfectly competitive settings which, in effect, views the mechanisms of the Arrow monopoly case as being at work when monopoly does not actually obtain, but firms are of diverse sizes. The point is, whatever use the innovating firm can itself make of the innovation provides a step toward appropriating the returns – and it is a large step when the firm is large and secrecy is effective or imitation is otherwise forestalled. There is a fundamental scale economy in capturing the returns from R&D/innovation, and the "scale" that often matters is the scale of application in the innovating firm.[8]

Of course, the reference to "existing capacity" signals the fact that this range of cases is in fact one special case of Teece's complementary assets scheme: when seeking to profit

[8] Steven Klepper subsequently placed this point center stage in the theoretical models use to interpret his many empirical studies of industry evolution. See, e.g., Klepper, S. (1996). "Entry, exit, growth and innovation over the product life cycle." American Economic Review **86**: 562-583..

from an idea about how to reduce production costs, it can be quite handy to have a lot of production capacity available on which to implement it. It is hard, at least for me, to resist the judgment that this mechanism must be a strong and reliable contributor to the progressiveness of capitalist organization. Consider, by way of elaboration of this judgment, that whoever sees business firms as highly idiosyncratic in their methods is thereby affirming the existence of multiple domains of potential innovation in which appropriability is strongly favored, independent of the legal context.

It is striking, in retrospect, to reflect that the *general* point about access to complementary assets did not jump out at us when we applied the special case in the context of cost-reducing innovation – just as, previously, Schumpeter and Arrow had not previously identified this line of thinking when discussing issues to which it plainly applies. It is also striking that, having modeled Schumpeterian competition in the way we did, Nelson and I did not insist on a prominent position for the complementary assets mechanism (even for the capacity case we had featured in our models) when we participated in the design of the Yale survey of R&D managers (Levin, Klevorick et al. 1987). Much more satisfactory in this respect was the subsequent CMU survey, an effort led by Wesley Cohen (Cohen, Nelson et al. 2004). But that was not only post-Yale survey, post- Nelson and Winter, post-Arrow, and post-Schumpeter, but also post-Teece!

Thus, Teece saw clearly something that many predecessors had missed, though they were struggling for insight in closely related areas. Further, his insight was of great generality and broad application. The above review focuses on the value of this insight in a range of relatively simple theoretical contexts where complementary assets are sometimes of critical importance and sometimes not, but in any case they are not all that interesting

from a business strategy viewpoint. Teece, however, was concerned with those interesting cases above all. To conclude this note, I offer some observations characterizing the economic logic of the interesting cases.

Notes on the interesting cases

To delimit these cases, we now depart from the previous scheme and suppose that the realization of value from the core novelty requires that it be complemented with goods or services that the pre-innovation economy does not contain, or contains in amount that is limited relative to the additional demands that full implementation of the innovation would require. One simple case is that the required complements are simply limited in supply, relative to the potential scope of the innovation, so that a price rise for the complements will occur if the innovation is introduced and fully implemented.[9] Another possibility, closer to Teece's focus, is that the complements are modified forms of existing goods and services. While not something that involves creativity or novelty comparable to the innovation itself, the modification can only be accomplished through specific investments of significant magnitude.[10] The need for such investments raises the question of who will finance them, and also the prospect of transactional hazards that

[9] This could appropriately be dubbed "the Hirshleifer case;" it raises the possibility that the innovator can appropriate gains by a timely move to take a long position in the complementary assets.Hirshleifer, J. (1971). "The private and social value of information and the reward to inventive activity." Ibid. **61**: 561-574.. Examples can be constructed in which the revaluation effect is so large that the innovator appropriates more than the total benefit, leaving the rest of society the loser. See also Teece (1986), at p. 295.

[10] In retrospect, such modifications may come to be seen as partially constitutive of "the innovation," especially if they do involve design and development work of some novelty. This is exactly the "obvious" point about the ambiguous "boundaries" of the innovation. The case of the CT scanner, one of Teece's examples, is a good illustration of this, particularly with respect to the role of computer technology..

may limit the viability of contractual modes of access to the complements (Williamson 1979; Teece 1986).

These considerations introduce a cluster of linked complications that are absent from the previous picture. Basically, they imply that there are multiple participants who may have a claim on some of the rents that the completed innovation might produce, and the specific nature of those claims is something that will be affected by the innovator's choice of appropriability strategy. The innovator has some range of choice as to the particular positive-sum game that will be played with these other participants, and the choice of that game will affect not only the returns that accrue to the various participants but also the shape of the innovation itself.

The considerations that shape these games and their outcomes include, first, the opportunity returns that would accrue to each participant if not included in the multi-party "deal" that yields the innovation. This is the consideration that Teece explored with the language of "dependence" between the innovation and the complementary assets (p. 289) – dependence which may be bilateral, or unilateral in either direction. A high opportunity return means low dependence on the other participants; such an actor does not seriously need to do the deal. A formalization of Teece's analysis might posit, for each possible structuring of the innovation game, a total return, the opportunity returns of the participating actors, and a characterization of the nature of each actor's participation. In such situations, predictions about quantitative outcomes are a challenging goal for formal theory. What is clear, however, is that the tool kit of non-zero-sum game theory has ready application here (Brandenburger and Harborne W. Stuart 1996; Lippman and Rumelt 2003).

A second major consideration is the nature the (legal) appropriability regime, i.e., the strength of intellectual property protection. One way to introduce this consideration is to view it as further subdividing the type of analysis suggested in the previous paragraph according to two or more alternative "modes of participation" of the focal firm. Teece's "tight appropriability regimes" are cases where the focal firm is bringing to the table the innovation itself; it cannot be excluded from the deal because its IP position gives it veto power. At the other extreme, the focal firm has zero IP protection and is in this sense one among several holders of relevant assets that have the potential to generate the innovation's rents when appropriately combined. Others (imitators) might possibly go forward by themselves if Focal tried to hold out for too big a share. In this case, clearly, everything depends on Focal's possible contribution and the possible substitutes for it. If Focal is actually an independent inventor with nothing to contribute to the cause but a good idea and a patent that won't actually protect, the prospects for Focal look grim.[11] If, however, Focal has 100% of the relevant distribution channels, or of the manufacturing capacity, the weakness of the patent may be irrelevant (as in the case of the monopolist innovator considered previously). The problem of cutting a deal with other participants remains in any case; veto power over the deal is not an entitlement to 100% of the surplus.

Conclusion

As suggested previously, the great value of Teece's analysis of appropriability lies in the power it confers to locate the essential elements in a very wide range of complex

[11] However, this presumes that the idea is observable in use, so that secrecy is not effectively available as a protection mode. The inventor might still keep the secret , of course, but could not do that and also get wealthy from it.

situations. Although my discussion touches on only a small portion of that range, I hope that it may serve to illustrate this point – and to illustrate as well that the Teece analysis is second to none in placing the analysis of appropriability on a sound logical footing (its disarmingly "relevant" presentation notwithstanding).

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