Justifying Antitrust Intervention in ICT Sector Patent Disputes: How to Address the Hold-Up Problem

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The economic justification for any regulatory intervention in patent litigation, especially those for standard essential patents, comes from the view that hold-up of users of patents is endemic to some industries, especially ICT. The paper reviews these reasons why hold-up is more likely in ICT industries and discusses the type of evidence that is available. It discusses the strengths and limitations of competition policy instruments and notes that addressing the issue is far more appropriate under an abuse of dominance standard that allows for exploitative abuses to be addressed. It is finally explained that nevertheless the use of such an instrument has severe limitations and explores the question of how incentives of standard setting organizations can be improved to make commitments to FRAND licensing more meaningful.

I. INTRODUCTION

With escalating patent disputes across the world and threatened and achieved injunctions in some jurisdictions (as well as the International Trade Commission in the US), there is a sense that the patent system is in crisis.[2] This is in particular the case in the ICT industries in which patent litigation has escalated over the past decade and the large multiplicity of patents related to any device appears to lead to a significant likelihood that any dispute concerning a small feature of the product can lead to temporary exclusion of socially valuable products from the market. In addition, it is claimed that such escalating litigation and the associated liability risks are bound to chill innovation–at least in fast moving markets. In fact, there is even a strong view on part of some economists that a complete abolishment of patents would be better for innovation and efficiency in the economy.[3] They point to the consistent evidence that has emerged in recent years that competition is a strong positive driver of innovation and claim that first mover advantages are sufficient to give innovation incentives in fast moving markets.

WITH ESCALATING PATENT DISPUTES ACROSS THE WORLD AND THREATENED AND ACHIEVED INJUNCTIONS IN SOME JURISDICTIONS (AS WELL AS THE INTERNATIONAL TRADE COMMISSION IN THE US), THERE IS A SENSE THAT THE PATENT SYSTEM IS IN CRISIS.[2] THIS IS IN PARTICULAR THE CASE IN THE ICT INDUSTRIES

In this paper, I argue the case for policy intervention in the patent disputes in the ICT sector from a more traditional view that takes the proposition that patents are a valuable incentive device for inducing innovation as given. This means that some distortion to optimal ex-post production is seen as a necessary second best device for giving incentives to innovation. However, such an incentive system has to strive to minimize the distortion that is created in consumption.

I will discuss in this paper that the most serious distortion that can arise is what economists call the hold-up problem. I explain the economics of the hold-up problem and why it is particularly severe in the ICT industries. These reasons include the fact that patent boundaries are almost impossible to determine ex-ante–even with a

good patent examining system.[4] This means that patent claims are necessarily quite uncertain, distinguishing intellectual property rights from other property rights. Furthermore, the large multiplicity of potential patents for any product offered in the ICT industries augment the uncertainty about infringement and validity for anyone considering investments into developing a new product. This combination of features also makes it impossible to write complete contracts about licensing conditions for existing patents before investing into the development of a new product

At the same time the costs of designing around a feature that has been incorporated into a product can be very high–especially when the product is forced off the market during the litigation period through preliminary injunctions.[5] Together with the inability of the developer of a new product to write ex-ante contracts for all relevant patents, the fact that workarounds are costly, makes hold-up of new product developers by owners of previously existing patents endemic to the patent system.

I explain why the issue of hold-up is particularly clear in the case of standard essential patents (SEPs) and why the problem of hold-up will lead to more severe distortions when industry participants are very asymmetric in their intellectual property portfolios. Such asymmetries are particularly pertinent when evaluating the role of non-practicing entities.

Before evaluating the policy instruments that may be available to alleviate the hold-up problem, I will address the issue whether empirically hold-up actually exists. It has recently been claimed that there is no evidence that there is a hold-up problem and therefore intervention is not justified. I argue that this claim arises from a misunderstanding of the nature of economic evidence and is fundamentally mistaken in its approach to evaluating counterfactuals. I will show that there is a solid body of theory and indirect evidence supporting the underlying assumptions of the theory (including indirect evidence on the importance of hold-up) that is as strong a positive economic case as one can make for intervention if one has a realistic view of the evidence that can be available. Secondly, there is little evidence that proposed interventions would have any negative effect on the incentives to innovate in the ICT industries. In the context of imperfect evidence, the weighing of likely positive effects of intervention and likely harm does indeed lead to a strong justification for policy intervention.

A more difficult question is what the right policy tools are for intervention aimed at correcting distortions caused by hold-up. I discuss these issues first in the context of SEPs. I note that in this context it appears at first surprising that the hold-up issues cannot be resolved by contracts. However, empirical evidence over a significant period of time shows that there seem to be almost insurmountable barriers to achieving such contracting solutions in the context of standard setting organizations without governmental intervention. I discuss the mixed record of court systems in the US and Europe and the limitations to resolving hold-up issues through the political process.

On this background I discuss the scope for antitrust intervention. I argue that the abuse of dominance standard is a more natural fit for addressing the hold-up problem than the monopolization standard. In particular, actions that clearly lead to a worsening of the hold-up problem can be directly identified as an abuse of a dominant position, while demonstrating foreclosure is not only much harder but also does not fit very well with the fundamental underlying issue of hold-up. I explore the limits of antitrust enforcement against individual firms and the scope for antitrust rules that would impose constraints on standard setting organizations.

II. THE PERVASIVENESS OF HOLD-UP AND ITS IMPORTANCE IN ICT INDUSTRIES

A. The Basic Hold-Up Problem

In well-functioning markets the creator of a new product would incorporate features into the product taking fully account of the license fees he has to pay for such incorporation. There would be competition between different solutions and the creator of the product would simply choose a solution that gives the best trade-off between licensing costs and value added to the overall product. In such an ideal world contracts are complete. If patents were to convey a monopoly the inventor would at least bargain the payment down to a point in which the feature would just be included in the product. The owner of the product has an incentive not to set excessive royalties in order to create an incentive for innovations to be adopted that include his intellectual property.[6]

However, in many real life situations the designer of a product has to make investment decisions that lock him into a single solution before he can negotiate with the patent holder whose rights are affected. To start with the most extreme case, suppose for the moment that after the investment into product development has been made, there is no possibility at all to sell the product without infringing on a patent. If a license could not be contracted on ex-ante, the investment into creating the new product is then sunk and the producer of the new product will bargain over the whole value of the product with the patent holder. This can be a much higher value than just the value of the product net of investment costs, which would be the case with ex-ante negotiation. The result is that any new product that is reliant on a specific patent to be able to stay in the market will make less of a return on investment and the incentives to innovate on products that might infringe on existing intellectual property as an input will decline.

The above argument assumed that the firm with the new product cannot avoid the patent by redesigning the product. In the real world there are often such possibilities. However, hold-up can still be severe. The reason is that it will always take some time to redesign a product to avoid infringement. The scope for hold-up then depends on the costs that can be imposed on the firm that is trying to sell the new product during the period of time in which it can redesign the product. If redesign is costless there is no hold-up. However, there are few situations in which redesign are of low cost. There are always delays to implement a new design even when the features are already known. The losses in the market place induced by not being able to sell for even a short period of time can be large. Take as an example the litigation between NTP and RIM between 2000 and 2006. Under threat of an injunction, which potentially could have interrupted Blackberry service for a short period of time, RIM settled for over $600 million. This sum most likely primarily reflected the massive long run expected loss of business arising from a spectacular shut down of service. Note that the market value of a patent in such circumstances does not reflect the intrinsic increase in value of the product that the patent generates but instead the value of the potential *costs* that can be induced through an injunction. The fact that market valuations seemed to value the patents even higher than the eventual settlement amount is therefore no evidence against hold-up. The fact that several of the relevant patents were later invalidated by the US patent office is rather evidence in the opposite direction. But by the time of patent invalidation, it was too late for RIM because the potential costs of delaying a settlement were just too high.

Similar ways of inducing large losses on a generation of devices by threatening and/or enforcing an injunction can be seen in the current patent wars. For example, Apple achieved an injunction in August 2011 (confirmed in

an appeals decision in September 2011) against Samsung's Galaxy 10.1 tablet in Germany. Although Samsung developed a workaround in only a month, it took until January 2012 to lift the sales ban. In this way Samsung missed a whole Christmas season for one generation of its devices despite being able to present a workaround in October. What this shows is that there are enough frictions in the system that can lead to very substantial losses even when workarounds are of low cost. Hence, hold-up potential is clearly high.

B. Why Hold-Up Problems Are More Severe in ICT Industries

Are all of the hold-up issues discussed above not simply the fault of RIM or Samsung? Shouldn't they have looked at the patents that they might have infringed and made a non-infringing product in the first place? Alternatively, they could have just licensed the patents they might infringe with the new product. If these strategies were available, there should be little sympathy for a firm that gambled by not acquiring a license. Why should they not pay heavily? They took the risk of entering the market without a license instead of negotiating for it beforehand.

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What such an assessment claims is that there is never any hold-up problem. It proposes that any contracting issue over patent licenses can be resolved before an investment into a new product takes place. Such an approach to the analysis of the current problems in IP licensing in the ICT industries overlooks that there is no perfect market for intellectual property. Indeed, some of the imperfections in the intellectual property system are particularly severe in the ICT industries. First, the boundaries of intellectual property rights are particularly unclear in this area.[7] This is not a matter just of inefficiently working patent offices. An early example in a high tech industry that illustrates this point is the dispute between Polaroid and Kodak after 1976. Kodak had extensively researched and assessed the Polaroid intellectual property rights on instant photography and concluded on the basis of expert reports that there was no infringement. And although the judge in the case conceded that Kodak had done everything to avoid infringement (and invent around Polaroid's intellectual property rights), it was found to infringe nevertheless.

The second issue is the proliferation of complementary patents (of uncertain validity and uncertain boundaries) in an industry that is particularly fast moving. The number of patents that could potentially be infringed by a new product is very large. A modern smart phone contains parts covered by thousands of patents–most of them uncertain in their scope and validity. Many potentially relevant patents will not be known to the designer of the

new product. Indeed, by coming up with the new product, the designer would have independently discovered the invention, if a patent is actually infringed. Kodak, for example, spent 10 years from the development of its technology to market entry trying to avoid patent infringement and failed. With the current innovation cycle in the ICT industry such careful and time consuming patent search and assessment would not be possible if one would want to compete with any product in the market. As a result, firms will have to invest in new products and develop them, knowing that there will likely be some infringement but that they cannot tell beforehand which part of the product is likely to infringe a patent and who holds the relevant intellectual property. This means that hold-up issues (i.e. investment before the negotiation over a license) are endemic to the ICT industry. Furthermore, negotiations and litigation on infringement will typically be strategically timed to coincide with particularly large losses from product exclusion, i.e. to times at which hold-up power is particularly large.

C. Standard Essential Patents and Hold-Up

While hold-up issues are therefore pervasive in the ICT industries, they come to particularly sharp relief in the standard setting context. By agreeing on a standard (or when mandating it by regulation), no product for which the standard is essential for operation can be brought to market without depending on the use of the intellectual property. This means that without any commitment to pricing at the time of the adoption of the standard, a hold-up problem will also be endemic. The reason is that any user who has to invest in a product that uses the standard will need to negotiate ex-post with the relevant patent holders. By agreeing to the standard, investments have effectively been committed to if the firm wants to produce.

THAT HOLD-UP ISSUES (I.E. INVESTMENT BEFORE THE NEGOTIATION OVER A LICENSE) ARE ENDEMIC TO THE ICT INDUSTRY. FURTHERMORE, NEGOTIATIONS AND LITIGATION ON INFRINGEMENT WILL TYPICALLY BE STRATEGICALLY TIMED TO COINCIDE WITH PARTICULARLY LARGE LOSSES FROM PRODUCT EXCLUSION, I.E. TO TIMES AT WHICH HOLD-UP POWER IS PARTICULARLY LARGE.

In order to avoid this recognized hold-up problem standard setting, organizations (SSOs) have tried to establish rules that limit the ex-post monopoly power of patent holders owning patents that read on the standard: the commitment to (F)RAND rates (i.e. licensing rates that are Fair, Reasonable, and Non-Discriminatory). Unfortunately, this standard has proven to be highly ambiguous so that claims on FRAND rates on the same patent can vary by several orders of magnitude. Since there is also very large uncertainty about what the courts will determine as a FRAND rate there appear to be incentives to make extreme claims about FRAND. The uncertainty about what FRAND is and how the courts will determine it effectively undermines the commitment and leads to a re-emergence of the hold-up problem: patent holders will exploit all of their bargaining power, which in circumstances in which courts are favorable and the litigation process favors patent holders can easily lead to considerable hold-up.

The discussions about SEPs have highlighted that hold-up can arise in two forms. One is through the award of excessive royalties by the courts. The second is through the process that leads to the determination of royalty rates. The latter is of crucial importance in real cases since the legal process will determine the outside options of the litigating parties and thus the bargaining power in any settlement process. For example Shapiro

has shown theoretically that unfettered injunctions will always lead to hold-up because they reduce the outside options of potential infringers in settlement negotiations relative to frictionless ex-ante negotiation process.[8]

To understand such biases against potential infringers, it is important to emphasize that patents in the ICT industry (and others) are probabilistic by nature. That the validity can never be satisfactorily determined ex-ante and that patent boundaries are vague leads to uncertainty about infringement on valid patents. A traditionalist view of patents might have assumed that all the bargaining power in such negotiations should go to the party who is holding the patent as long as it has been determined that the patent is not invalid. However, this forces the potential infringer to bargain as if the patent were valid for sure. As a result, the patent holder can extract far more in expectation than in a process in which validity and infringement could be determined instantaneously. This means the more the outcome of settlement bargaining can be tied to the actual final decision of a court or arbitrator, the more accurately the expected return reflects the actual social value of the patent. Rules that tilt the bargaining power toward the patent holder can significantly increase the hold-up problem and lead to a reduction in innovation in the market.

THE MORE THE OUTCOME OF SETTLEMENT BARGAINING CAN BE TIED TO THE ACTUAL FINAL DECISION OF A COURT OR ARBITRATOR, THE MORE ACCURATELY THE EXPECTED RETURN REFLECTS THE ACTUAL SOCIAL VALUE OF THE PATENT. RULES THAT TILT THE BARGAINING POWER TOWARD THE PATENT HOLDER CAN SIGNIFICANTLY INCREASE THE HOLD-UP PROBLEM AND LEAD TO A REDUCTION IN INNOVATION IN THE MARKET.

This insight explains the focus on injunctions in recent discussions on antitrust and other policy interventions. In particular, it underlies the concerns at the European Commission about the German Orange Book decision and its interpretation by the courts. Effectively a party that has been found to infringe can avoid an injunction by settlement, but this requires foregoing a later challenge of the validity of the patent. This will be true even if, as is often argued by its defenders, a preliminary assessment of likely validity is made by the court. Shapiro's analysis clearly implies that such a rule will lead to hold-up.

D. Asymmetries and the Hold-Up problem

Hold-up problems will not appear very severe when the different parties to the contracting are in a very similar position. Suppose that on average firms expect that that they will be as often (and severely) in a position to be held up by another firm as they are in a position to hold up the other firm. In terms of bargaining this evens the threat points. Indeed, an optimal solution is then to come to an ex-ante agreement to broadly cross-license the whole patent portfolio.

In the information technology sector such agreements have worked for a long time and allowed firms to innovate without having regard to potentially infringing patents of their main competitors. What has changed in the ICT industries is that the convergence and integration of different technologies–especially in mobile devices–has brought companies together with very different types of patent portfolios. The relative hold-up values of these portfolios are apparently much less clear across different previously non-integrated industries so that cross-licensing solutions become much harder.

In addition, cross-licensing solutions only tend to work between large firms with broad patent portfolios who are also practicing those patents. Whenever small companies need to negotiate with larger ones patent hold-up would re-emerge. Similarly the incentives of non-practicing entities, which do not produce products that might incorporate patents of other firms, do not have the possibility to trade on mutual hold-up opportunities. Hence, they will fully exploit the hold-up power that exists. To the extent that hold-up is an endemic problem in ICT industries, the tendency towards a greater role of non-practicing entities enforcing patent rights will lead to greater inefficiencies. In this sense clearer preventions of hold-up facilitating tendencies in the judicial process and hold-up preventing processes and rules for FRAND royalty setting (that remain in force even after a patent has been transferred) become even more important for preventing an increasing efficiency reducing impact of hold-up.

III. "SHOW ME THE HOLD-UP": ARE WE FIGHTING THEORETICAL WINDMILLS?

As a result of the clearer conceptual focus on hold-up, many critics of policy intervention have withdrawn to the position that "there is no empirical evidence that there is hold-up." In particular, it is often alleged that there is no evidence that hold-up has slowed innovation. This argument is akin to the old chestnut that there cannot be market power in the market because prices have been falling. The fallacy in all such arguments is that they ignore the fundamental concept of the counterfactual. Looking at a historical price path or a historical innovation path, one cannot determine whether price is higher or lower or innovation is higher or lower than the outcome in an efficiently operating market absent the market power effect.

The questioning of hold-up in the current discussion comes from a fundamental misunderstanding of valid economic evidence. The question is: how do we evaluate the observed outcomes in the market relative to an unobserved benchmark? In mergers, in which the competition authority is mainly interested in price effects, this is already difficult but not impossible to do empirically. Sometimes there are natural experiments in which a competitor is temporarily not in the market, is facing higher costs than the rival etc., which allows one to evaluate the degree of competitive pressure between rivals (from the variation in interaction).

But even in merger analysis some theoretical insight is necessary to interpret empirical results and guide the analysis on what one should look for. For example, the declining price fallacy arises from the belief that competition leads to falling prices. That is not the case. Productivity improvements lead to lower marginal costs, which will be passed on to consumers by firms. A monopolist will pass on cost reductions to some extent, because the optimal policy for rent extraction resolves a trade-off between a high price and high sales. But typically (although not always) competitive markets will have greater pass-through of cost reductions than a monopolized market. An increase in market power can thus be detected (after the fact) by changes in pass-through rates of cost reductions.

In most of antitrust analysis–especially when it comes to the impact of anticompetitive behavior on innovation rates (whether measured in R&D spending, or patent applications, etc.)–the counterfactual to the observed behavior is unobservable. The strongest evidence we have in these cases is a coherent theory of harm paired with evidence that the *assumptions* of the theory of harm apply to the industry and (at best) some indirect evidence that the anticompetitive effects appear to be a concern for the industry. This is the best one can do in terms of evidence in almost *any* antitrust case. Demanding a higher standard will make antitrust intervention

impossible. In fact, it probably would instead encourage more heavy handed regulatory intervention.

These limitations on feasible evidence do not mean that the standards are particularly low ones. It just means that the weight of theoretical considerations in the body of evidence has to be stronger. Indeed, the greatest challenge to antitrust authorities is often the formulation of a coherent theory of harm that satisfies basic economic logic and is consistent with incentives of the parties. Enforcement against selective distribution systems and other interventions on vertical relationships are examples among others where there are many antitrust interventions that are not based on *any* coherent theory of harm in the sense of analyzing the incentives of firms and therefore are not disciplined by a test of whether the central assumptions of the theory make sense in view of empirical evidence.

In the case of patent hold-up this is very different. We have excellent theoretical analyses of how hold up arises in patenting and that it is pervasive when certain conditions (like investments before license negotiation, certain features of the litigation process) are satisfied. Empirically, we have strong evidence that hold-up matters–and not just in standard essential patents. First, the RIM case has shown impressively how market costs of workarounds can create hold up as an ex-post phenomenon. We understand from empirical evidence that it is almost impossible to have patents that are not fairly uncertain in their validity or in their effective scope. Even extreme due diligence cannot avoid that a firm might reasonably conclude that it cannot possibly be infringing but the court disagrees. The great multitude of potentially relevant patents cannot all be reviewed if one wants to bring products to market in a timely way. This means that all the conditions for hold-up are generally present in the industry.

IN THE CASE OF PATENT HOLD-UP.... WE HAVE EXCELLENT THEORETICAL ANALYSES OF HOW HOLD UP ARISES IN PATENTING AND THAT IT IS PERVASIVE WHEN CERTAIN CONDITIONS (LIKE INVESTMENTS BEFORE LICENSE NEGOTIATION, CERTAIN FEATURES OF THE LITIGATION PROCESS) ARE SATISFIED. EMPIRICALLY, WE HAVE STRONG EVIDENCE THAT HOLD-UP MATTERS–AND NOT JUST IN STANDARD ESSENTIAL PATENTS.

Similar conclusions apply for standard essential patents. If patents are essential for the implementation of the standard, they are unavoidable. Empirically, royalty setting occurs after the standard has been adopted and thus investments have been committed to. Such an institutional set up will necessarily lead to the hold-up problem. The fact that ex-ante (F)RAND constraints have been agreed to in standard setting organizations is evidence that members themselves recognize the hold-up problem. But the mere fact that there can be disagreements of several orders of magnitude on the "true" FRAND rate implies that the hold-up problem persists even with FRAND. To see this, note that parties would easily come to a settlement (or disagree less) if they had a clearer view of what courts would consider to be FRAND. The evidence thus shows that firms perceive courts not to put very predictable limits on FRAND rates inducing prolonged litigation. Again, based on the theory of hold-up and theories on why litigation persists, i.e. an analysis of incentives, it is obvious that the observed facts make it highly likely that the hold-up problem persists.

The patent cases in ICT industries that challenge the use of injunctions therefore satisfy the central requirements for a solid antitrust case. There exists a well specified theory of harm based on the analysis of incentives of

patent holders and potential patentees that implies hold-up and the associated harm. Second, there is considerable evidence that the general conditions under which one would expect such theories to apply are satisfied. There is thus coherence here between the theory, its assumptions, and the predictions it makes about market outcomes, which jointly generate a body of evidence that meets the typical standard of proof for antitrust cases; whoever thinks these do not should be honest enough to plead for a complete abandonment antitrust intervention against unilateral conduct. In fact, the standards of proof for regulatory intervention in markets tend to be far lower.

However, when one looks at the appropriate standard of proof one should not just address the question how strong the evidence for harm is. The appropriate standard should also depend on the potential social cost of intervention. If the social cost is potentially very high, one might want to have a higher standard of proof for the market failure that one is intending to address. In the antitrust cases on injunctive relief, there is strong evidence based on conceptual that the costs of suppressing interim injunctions should in most cases be small.[9] But there is also the question on how important the patent system is in giving innovation incentives in the particular industry of concern. Views on this differ: There are some very strong views among academic economists that the empirical support for the effectiveness of the patent system is rather scant. Boldrin and Levin write: "The case against patents can be summarized briefly: there is no empirical evidence that they serve to increase innovation and productivity, unless the latter is identified with the number of patents awarded–which, as evidence shows, has no correlation with measured productivity."

Just as in the broad claim on the empirical absence of evidence on hold-up, this statement has its problems as to the measurement against a well-specified counterfactual. But Boldrin and Levin may have a valid point that the value of the patent system appears to be considerably lower in ICT industries. For example, the explicit acknowledgement of many firms in the industry that they patent not in order to enforce their patents, but in order to threaten counter action should any one try to enforce theirs indicates that it is not the prevention of imitation that seems to determine patent behavior. Instead, it is a defensive use of patents to mitigate the risk from a firm's product infringing on some patent of a competitor. Indeed, Google's bid for Motorola was quite explicitly justified by the ability of Google to acquire a patent portfolio that could be used as a bargaining tool for IP cross-licensing. In fact, this is precisely the way one would expect patents to be used in an industry in which ex-ante contracting is difficult, hold-up is endemic, and defensive measures against hold-up become a central part of IP strategy.

IV. WHAT IS THE RIGHT POLICY INSTRUMENT TO ADDRESS HOLD-UP?

If one believes that on the basis of the current evidence some intervention to limit hold-up incentives has greater benefits on average than the potential expected costs of an intervention, there is still the question of how intervention should take place and what the best policy instrument is. Theoretically, it might even be the case that in the absence of potential regulatory intervention market incentives might be strong enough to create institutional solutions for the hold-up problem, but that the threat of intervention takes pressure of the actors in the market. In this section I will therefore explore the record on different potential solutions in order to better put the role of antitrust into perspective.

A. Letting the Usual Suspects Resolve the Problem

1. IT IS A CONTRACTING PROBLEM: LET THE MARKET DO IT!

While there is significant harm to consumers when hold-up problems are not avoided, this does not imply that intervention is needed. A naïve economist would think that the problem could easily be averted by writing better contracts at the beginning of the process. In other words, firms participating in a standard setting process should have an incentive to resolve hold-up problems through ex-ante contracting in the framework of standard setting organizations. Ex-ante contracting could then avoid any hold-up problem. Consequently, any observation of a lack of ex-ante contracting would simply reflect that the hold-up problem is not important enough to justify the relatively low transaction costs of negotiation.

However, a sound economic analysis is not just based on such theoretical considerations, but has to take into account the mounting empirical evidence that SSOs do not seem to be capable of agreeing on ex-ante terms even where extensive discussions take place. Secondly, it has to acknowledge that the evidence suggests that relatively costly and inefficient (temporary) exclusion from markets does occur and that there seem to be instances in which patent holders obtain very favorable deals for patents with dubious validity, suggesting a persistent hold-up effect. This means that the transactions cost of coming to ex-ante agreements of licensing appear to be much larger than the usual transaction costs of contracting. And if transaction costs are high enough, hold-up does indeed become inevitable and interventions to reduce it become ex-ante efficient.

HOWEVER, A SOUND ECONOMIC ANALYSIS IS NOT JUST BASED ON SUCH THEORETICAL CONSIDERATIONS, BUT HAS TO TAKE INTO ACCOUNT THE MOUNTING EMPIRICAL EVIDENCE THAT SSOS DO NOT SEEM TO BE CAPABLE OF AGREEING ON EX-ANTE TERMS EVEN WHERE EXTENSIVE DISCUSSIONS TAKE PLACE.

The difficulty of obtaining agreements in standard setting organizations also appears to have good economic reasons: the negotiation of royalty rates before the adoption of a standard is problematic because it requires the revelation of research results before the standard is adopted. This revelation of information may reduce the ex-ante incentives for investment into intellectual property supporting a standard and make standard development harder. Quite typically applications for patents reading on a standard come very late in the process. Furthermore, in the standard setting process different players have systematically different incentives, which appears to be one factor that has prevented agreements on a sharper definition of FRAND and of a dispute process over FRAND in standard setting organizations like ETSI.

This does not mean that private contracting cannot or should not be part of a solution to the patent hold-up problems for standard essential patents, but the current evidence suggests that this will not occur without significant regulatory intervention that improves the incentives for coming to private agreements. The question then is not whether private contracting can lead to efficient outcomes, but what regulatory framework for SSOs creates the right incentives to come to agreements within SSOs that lead to both commitments to avoid the hold-up problem and incorporate the specialized knowledge of the industry to achieve efficient solutions.

2. LET THE COURTS DO IT!

Given the proven inability of private contracting solutions to resolve the hold-up problem it still appears *a priori* reasonable that the courts may be able to address the problem through adjudication of infringement, FRAND royalty fees, and determination of patent validity. In fact, the court system is the mechanism that is typically used to reduce the impact of incomplete contracting in by providing a way to resolve non-contracted for contingencies.

Indeed, even in the area of patent litigation, the US courts have gone very far in terms of limiting the elements of the litigation process that are most likely to increase the hold-up problem. Through the eBay judgment (and also through a recent opinion of Judge Posner in another matter), injunctions for patent infringements have been dramatically curtailed, essentially only applying when there is a real danger that the patent holder might not be able to recover damages in case of a finding of both infringement and validity. While these developments do not necessarily remove all issues concerning the determination of FRAND rates, a uniform application of the rules limiting injunctions would go a long way to limit the hold-up problem because they reduce the bargaining power of the patent holder only in the case of hold-up.

Unfortunately, the situation in Europe is much less promising. Different jurisdictions in Europe have adopted different rules. Some of these rules as those from the Orange Book judgment (in particular as applied by the Mannheim court) require giving up validity challenges in order to avoid injunctions and may require inordinate posting of bonds while the FRAND rate is determined. Such rules largely maintain the hold-up problem and lead to clear inefficiencies. The strong heterogeneity in court decisions and lack of clarity of rules therefore suggests that a reliance on the convergence of courts in different jurisdictions is unlikely, and a more direct regulatory intervention appears to be needed.

3. SOLVING THE PROBLEM THROUGH THE POLITICAL PROCESS

While an eventual resolution through the political process may be desirable, it is highly unrealistic that legislation would be adopted in the medium term. This would therefore not address the important market distortions we are observing at the moment due to the explosion in patent litigation in the ICT industries.

C. What Can Competition Policy Contribute?

In principle, the hold-up problem is a well-defined competition phenomenon involving an excessive amount of market power due to an increase in market power after a patent specific investment. Even where a patent should give monopoly power, it would be relative to the outcome of a complete market with ex-ante contracting. Hence, there is an excessive exercise of ex-post market power that is in play. The social cost comes both from the reductions in ex-ante incentives to invest in new products due to excessively high costs of patented inputs due to anticipated hold-up as well as the social costs generated from the disputes. These costs are exacerbated by temporary exclusion of products from the market, and its costs to consumers in form of less choice and higher prices due to reduced competition. As such, the hold-up problem can therefore be thought of as a classic competition problem to the extent that the market power exercised exceeds what you would get from the patent in a well-functioning world of complete contracts.

There are, in principle, two potential competition policy instruments that can address this issue under European antitrust rules that are based on a dominance standard. One can both construct arguments addressing the hold-up problem based on exploitative abuses (essentially excessive pricing) and on foreclosure abuses. I will here only discuss the excessive pricing abuses and will discuss the foreclosure arguments and the difficulty of implementing them further below when I deal with the monopolization standard used in the US.

An exploitative abuse can in principle be argued quite straightforwardly, since hold-up involves an excessive price relative to the appropriate ex-ante counterfactual of complete contracting. In addition, any actions that lead to excessive pricing have particularly high costs due to the reduction of innovation associated with hold-up in this industry. While this gives a stringent conceptual reason for applying exploitative abuse approaches to patent litigation cases in antitrust, there are some issues that might limit the appropriateness of the antitrust instrument.

First, the application of an abuse claim requires the existence of dominance. Such dominance claims have sometimes been ridiculed by lawyers in such cases. In a nutshell the question they raise is: How can you have dominance when the patent involved is only one of many? My impression is that this way of posing the question is a remnant of a traditionalist view of dominance that is not informed by economic reasoning. In modern antitrust we have come to see dominance as equivalent to strong market power. Patents licenses are complementary inputs for the products in this industry. With many necessary complements as input, each complementary input has monopoly power if there are no short run substitutes around. The dominance claim in these cases then becomes economically straightforward because the requirement of a standard turns the essential patent holder into an ex-post monopolist for any user of the standard (and on top of it one who has ex-ante promised not to exploit the monopoly position). This is true even if the patent is eventually shown to be invalid or inessential if an interim injunction can be used to influence ex-post royalty negotiations. Only when workarounds for a standard essential patent were possible at low cost for an infringing firm would a claim of dominance be problematic economically.

IN SOME CASES THERE ARE BEHAVIORS ASSOCIATED WITH EXCESSIVE PRICING THAT MAKE THE SCOPE FOR EXCESSIVE PRICING MORE SEVERE. IN SUCH CASES, INTERVENTION AGAINST SUCH BEHAVIOR CAN MOVE PRICES IN THE RIGHT DIRECTION WITHOUT THE NEED TO EXPLICITLY DETERMINE THE CORRECT PRICING BENCHMARK.[10]

Another issue with the excessive pricing approach is that hold-up needs to be measured against some benchmark. This benchmark problem is the typical problem of all excessive pricing (or exploitative abuse) cases. If the only solution comes down to explicit price regulation, this is often impossible to solve in a competition policy setting due to informational constraints. However, in some cases there are behaviors associated with excessive pricing that make the scope for excessive pricing more severe. In such cases, intervention against such behavior can move prices in the right direction without the need to explicitly determine the correct pricing benchmark.[10]

In principle, an excessive pricing standard could address both the procedural aspects that lead to greater hold-up as well as the determination of the FRAND rate itself. Given that the determination of a FRAND benchmark leads to the usual problems of price benchmarking in excessive pricing cases, limiting hold-up by addressing procedural issues like injunctions, dispute resolution, other ancillary rules in the standard setting context, or ways on how to commit to FRAND terms, appears to be a more promising way to move rates in the

direction of the theoretical ex-ante royalty rate in a complete contracts regime.[11] For example, threatening and/or using injunctions before validity has been resolved and rates have been set can be interpreted as a means of exploiting the judicial process to further enhance the ex-post bargaining power that allows the patent holder to achieve excessive royalties. A prohibition of asking for such injunctions (always under the appropriate caveats) can therefore limit hold-up and thus push royalty rates in the right direction.

THERE MAY BE A BENEFIT OF GIVING GUIDANCE TO THE COURTS AND ESTABLISH A REASONABLE METHOD FOR DETERMINING A ROYALTY BASE, WHICH MAY MAKE REASONABLE FRAND RATE RANGES EASIER TO DETERMINE. IN PARTICULAR, IN THE ICT INDUSTRIES WHERE A MULTITUDE OF PATENTS RELEVANT TO ANY SINGLE DEVICE MIGHT MAKE IT HARD TO DETERMINE THE CONTRIBUTION OF ANY SPECIFIC PATENT TO THE VALUE OF THE PRODUCT, SIMPLE RULES BOUND THE DETERMINATION MIGHT AT LEAST REDUCE THE UNCERTAINTY OF COURT DECISIONS AND REDUCE LITIGATION COSTS THROUGH INCREASED CERTAINTY.

Of course, interventions that address the process by which royalty rates are determined instead of setting them directly may come with their own incentive problems. For example, the main obstacle to a straightforward prohibition of injunctions before determination of validity and level of the FRAND rate appears to be that a potential licensee may have an incentive to extend negotiations indefinitely in order avoid paying any royalties. This issue is typically discussed as the question whether the potentially infringing party is a "willing licensee." The challenge for competition policy lies in finding criteria for willingness that make economic sense and allow mitigating the hold-up problem. Encouragingly, there seem to be some simple potential safe haven rules that have the structure of allowing an economically meaningful action by a potential licensee to avoid injunctions: For example, a binding commitment to submit FRAND determination to the courts (or some other arbitration mechanism)–without losing the right to challenge validity. By establishing a safe haven rule of this type, competition policy can provide a framework, which can mitigate the hold-up problem and at the same time is well based in competition principles.[12]

It should be clear that a solution to the injunction issue does not necessarily eliminate all hold-up. But this does not necessarily speak against such an intervention. After all, the measure pushes settlements in the right direction and increases the probability of settlement by creating more legal certainty. It thus decreases the disincentive to innovation and reduces the impact of products being temporarily removed from the market.

But why not go further with an excessive pricing abuse claim and fix the problem of FRAND rate setting directly? After all this would address the hold-up issue head on and potentially resolve the thorny issue of what FRAND is? I believe that the problem here is a limitation of the effectiveness of competition policy instruments for the task at hand. Antitrust cases work well, where they resolve a particular issue in a particular case and give clear guidance to behavior in the future. The problem with determining FRAND rates is that the concept can be given clear meaning in terms of a theoretical counterfactual (i.e. rate that would have been obtained in a complete contracting world), but that there is no sufficiently simple algorithm to get to the right result in individual cases. An antitrust proceeding tends to be far too long and the informational problems so severe that determining FRAND seems outside the scope of antitrust authorities.

Nevertheless, it seems that also courts have difficulties to adjudicate on appropriate FRAND rates. Claims of parties about the appropriate FRAND rates can differ by several orders of magnitude, indicating that courts are sufficiently confused about the right order of magnitude for exaggerated to influence outcomes. Hold-up may thus be more severe because of a significant potential for excessive, but untestable, claims to succeed.

For this reason there may be a benefit of giving guidance to the courts and establish a reasonable method for determining a royalty base, which may make reasonable FRAND rate ranges easier to determine. In particular, in the ICT industries where a multitude of patents relevant to any single device might make it hard to determine the contribution of any specific patent to the value of the product, simple rules bound the determination might at least reduce the uncertainty of court decisions and reduce litigation costs through increased certainty. In particular, rules on the relevant royalty base for a patent could reduce the complexity of royalty determination and thus facilitate court decision making. Indeed, there may even be some good economic arguments that can be used to determine a reasonable royalty base.

However, there are significant practical problems for implementing a rule on royalty base with the tools of antitrust. Can the use of a particular royalty base by a patent holder ever be found an abuse of a dominant position? In principle, any base could be considered unproblematic if the royalty rate is appropriately adjusted. The difficulty for the courts is that without a common standard for comparing rates the appropriateness of the scaling is unclear. But giving guidance on such scaling is not necessarily a competition enforcement issue. It may therefore be difficult to use competition policy instruments beyond giving guidance on procedural aspects of FRAND in bounding the ranges for FRAND determination.

In principle, the standard setting organizations themselves would be in a much better position to determine rules of thumb that are appropriate for their own standard and use them as a more specific commitment than the vague notion of FRAND currently used. In the end, it is therefore likely that only multiple instruments can fully address the hold-up problems in patenting even when an excessive pricing instrument is available. Nevertheless, as we have seen, the abuse of dominance instrument can contribute something by limiting the competition distortions caused by the use of hold-up increasing procedural measures like injunctions.

Under a monopolization standard, the scope for intervention through competition policy instruments seems to be somewhat more limited. Excessive pricing cannot be captured by such a standard since the price setting behavior as such is not monopolization but just the use of a position of market power. It thus becomes central to construct arguments on the basis of an economically coherent foreclosure theory, which always is a difficult task.

A foreclosure argument requires proof that significant product innovations are likely to have been prevented by the possibility of hold-up or it would require actual foreclosure of competitors from markets to occur, for example, through an injunction. The problem is that non-investment in new products is very hard to prove. The foreclosure argument does also not exactly match the analysis of hold up as the central problem. If foreclosure is at stake, the demand of a royalty rate and subsequent request of an injunction are all geared to exclude a competitor from the market. This does not seem to exactly fit the problem that has generally been identified by those arguing for regulatory intervention. Similarly, there are many cases in which the patent holder and patentee are not in the same market (e.g. in the case of patent trolls). The typical foreclosure theories would then not apply. Since a monopolization standard makes essentially makes it necessary to argue foreclosure, the ability to address the patent hold-up problem will be more limited than under a dominance standard. It is

therefore not surprising that in US antitrust these issues have only been taken up by the FTC and under Section 5 of the FTC Act. It is a reflection of the fact that foreclosure theories of antitrust do not appear to be a good framework to address FRAND terms or the use of injunctions.

The above analysis has described a coherent defense of antitrust intervention through an excessive pricing instrument in the current patent disputes, but also shown that there are severe limitations to this instrument. In particular, it is hard to envision that competition policy could take a more direct role in FRAND determination.

V. COMPETITION ENFORCEMENT TOWARDS STANDARD ORGANIZATIONS

The limited ability of both the courts and the competition authorities to determine what FRAND rates are, points to the standard setting organizations themselves to address the issue in the context of the specific standard involved. Only in this way could a satisfactory commitment be created that reliably controls the hold-up problem. Unfortunately, standard setting organizations have a very poor record at coming to an agreement on these issues–and not because they have not been discussed. The challenge for policy may therefore be to design policies that increase the incentives to come to meaningful agreements within the standard setting organizations themselves.

IT IS POSSIBLE THAT A BETTER WAY OF INTERVENTION IS A REGULATORY FRAMEWORK FOR STANDARD SETTING ACTIVITIES.

Could competition policy intervention towards standard setting organizations be such a policy route? Such a question is not all that outlandish given that SSOs consist of agreements between firms, many of which are competing in industries that are using the standards developed as inputs. Since certain types of rules facilitate hold-up and standards setting creates the monopoly power that comes with standard essential patents, the degree to which SSOs are beneficial to the competitive process rather than competition restricting agreements may depend on the specification of FRAND determination and dispute resolution rules in these organizations. It is possible that a better way of intervention is a regulatory framework for standard setting activities. But given the varied nature of standard setting bodies competition policy may have to have a complementary role. Indeed, recognizing this potential role may by itself further facilitate a resolution of the current patent disputes in the ICT industries.

VI. CONCLUSIONS

I have argued that, in terms of economic analysis, the hold-up problem at the heart of the patent abuse cases (especially in the standard essential patents) world can naturally be analyzed from a competition policy point of view. In an abuse of dominance framework, they fit most naturally into an exploitative practices category (i.e. a form of excessive pricing). Economic analysis makes a foreclosure argument that would be the only approach for a monopolization standard much less natural and far more difficult to prove. However, even with an exploitative abuse framework there are severe limitations on what competition policy can do in practice. Going beyond the banning of behavior that increases the hold-up problem, as the use of preliminary injunctions, appears to be almost impossible to achieve using competition policy instruments.

Competition policy intervention in Europe has so far confined itself to the limits suggested by this analysis.

It has taken a very limited role focusing exclusively on preliminary injunctions. Nevertheless, this may not fully address the hold-up problem. While the best way to resolve these issues is probably within the SSOs themselves, it appears that an appropriate regulatory framework that encourages agreement within these organizations is currently not in place.▲

1. University of Michigan, DICE, and CEPR

2. Recent publications by economic and legal scholars on the patent system speak of "Patent Failure" and "Patent Crisis". (See J. Bessen and M.J. Meurer, "Patent Failure: How Judges, Bureaucrats, and Lawyers put innovators at risk", Princeton University Press 2008; D.L. Burk and M.A. Lemley, "Patent Crisis and how the courts can solve it", The University of Chicago Press, 2009).

3. M. Boldrin and D.K. Levine: "The Case Against Patents", FEDERAL RESERVE BANK OF ST. LOUIS, Working Paper 2012-035A.

4. See Bessen and Meurer (2008), chapter 3, for an extensive discussion.

5. Indeed, Shapiro, Carl (2010), "Injunctions, Hold-Up, and Patent Royalties", American Law and Economics Review, 12, pp. 280–318 shows that such hold-up will also occur with permanent injunctions

6. This does not mean that there is no distortion. Any contracting with a revenue or quantity based royalty will generate some degree of market power distortion. But this can be attributed to the way that the patent is meant to lead to a transfer of rent.

7. See Bessen and Meurer (2008).

8. Shapiro, Carl, 2010, "

9. See Ayres and Klemperer (1999), "Limiting Patentees Market Power Without Reducing Innovation Incentives: The Perverse Benefits of Uncertainty and Non-Injunctive Relief", Michigan Law Review, 96, pp. 985-1032. The main reason such suppression could be costly is when parties eventually cannot pay. However, there is no proposal in which this is not suggested as an exception to the general rule on injunctions envisaged.

10. For example, if a firm is a monopolist in country A but faces almost perfectly competitive conditions in country B. Assume that country B is also much larger. Then a requirement of non-discrimination will lead to approximately competitive pricing in country A (without moving the price in the much larger country much), leading to an improvement without determining the price level.

11. A discussion of different aspects of such procedural issues is given in Kühn, Scott Morton, and Shelanski (2013) (2013) 'Standard Setting Organisations can help solve the Standard Essential Patent licensing problem'. CPI Antitrust Chronicle, March 2013. Besides rules on injunctions these may include dispute resolution systems, rules on transfer of IP rights, and other aspects of the functioning of SSOs that could limit hold up problems.

12. Again there may be issues of preventing default of payment after a FRAND determination has been made that might require putting license payments in escrow before a final determination of the license fee liability. But these can in principle be incorporated into any safe haven rule of this type.