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Economics of Property Formation – Adjustment of Property Boundaries with Examples from Swedish Legislation

Thomas Kalbro[1]
Dept. of Infrastructure,
Royal Institute of Technology in Stockholm
Drottning Kristinas väg 30, 10044 Stockholm, Sweden
thomas.kalbro@infra.kth.se

Abstract. *Microeconomic theory can illuminate various problems pertaining to urban economics. This paper focuses on problems related to property formation, especially adjustment of property boundaries. The aim of the paper is to provide models for analysis and discussions concerning (1) the incentives for property owners to adjust the boundary between their properties, (2) the purpose of legislation governing the design of properties and, finally, (3) the reasons for compulsory purchase. In connection to the latter part the issue of a fair and reasonable compensation is discussed.*

Keywords: *efficient land-use, compulsory purchase, compensation, profit-sharing, property formation, reallotment, transaction costs*

1 Introduction

In order for a society to develop, there has to be an efficient way of altering rights in land and property boundaries. For example, the administrative costs associated with the purchase and sale of land and property should be kept low, as should thecosts entailed by property formation.

The present article sets out to show theoretically how the adjustment of property boundaries should be conducted. In Sweden these boundary adjustments usually take the form of reallotment (*fastighetsreglering*), which can be illustrated as follows.

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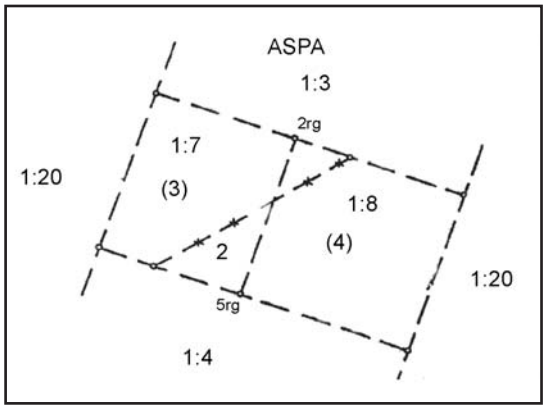
[1] Thomas Kalbro is professor in Real Estate Planning and Land Law, Dept. of Infrastructure, Royal Institute of Technology in Stockholm.



This figure shows a transfer of land between properties Aspa 1:7 and 1:8 in order to form two plots, (3) and (4), that will be suitable for building development. The present property boundary, crossed out in the figure, will cease to apply and a new boundary will instead be formed between boundary points 2rg and 5rg. So the transfer of land will mean area 1, belonging to Aspa 1:7, being transferred to Aspa 1:8. Similarly, area 2, which belongs to Aspa 1:8, will be transferred to Aspa 1:7. As a result of this change in the property boundary, the "new" Aspa 1:7 will form plot (3) and Aspa 1:8 will form plot (4).

The analysis in this article is based on microeconomic theory of the kind used by Harvey and Jowsey (2004) and others to illuminate various problems pertaining to urban economics. Section 2 addresses the reasons for two property owners having an incentive to adjust the boundary between their properties and the property formation which is optimum from their point of view. In many countries, property owners are not at complete liberty to decide property formation, because it is also subject to legislation. Section 3 therefore deals with the purpose of such legislation. Swedish law, for example, makes it possible, under certain conditions, for certain property boundary adjustments to be made coercively, i.e. against the property owners' wishes. Section 4 deals with the reasons for compulsory purchase and with compensation issues thus raised.

2 Voluntary adjustment of property boundaries

In order for a voluntary transaction involving a commodity to take place, the following basic condition must generally be satisfied. In order, for example, for the sale of a property to come about, purchaser and seller must put different values on the property. In order for the seller to be prepared to part with the property, the purchaser must pay a price which at least equals the value put on the property by the seller. At the same time, of course, the purchaser is not prepared to pay more than the property is worth to him. In other words, a price has to be agreed on in between the values put on the property by the purchaser and the seller.

Voluntary sale always involves a "profit". This profit is the difference between the values put on the property by the purchaser and the seller. If the agreed price comes close to the seller's valuation, i.e. if the price is low, the purchaser will get

a bigger share of the profit. Conversely, the closer the price comes to the value put on the property by the purchaser – the higher the price paid – the greater will be the seller's share of the profit.

A corresponding argument can be applied to the adjustment of property boundaries, i.e. transfers of land between two properties. In order for a voluntary transfer to take place, the land must be differently valued by the party respectively obtaining and relinquishing the land.

The typical situation prompting the adjustment of property boundaries can be described as illustrated in figure 1. This shows two properties, A and B, with an existing property boundary PB_0. The two curves MV_A and MV_B indicate the value of the properties per sq. m., *marginal values* of the properties and additional land. In this figure marginal value is assumed to diminish, i.e. the value per sq. m. to decline, the further away from the "centre" the land is situated. This is a reasonable assumption normally made concerning agricultural and forestry properties, plots for single-family housing development etc.

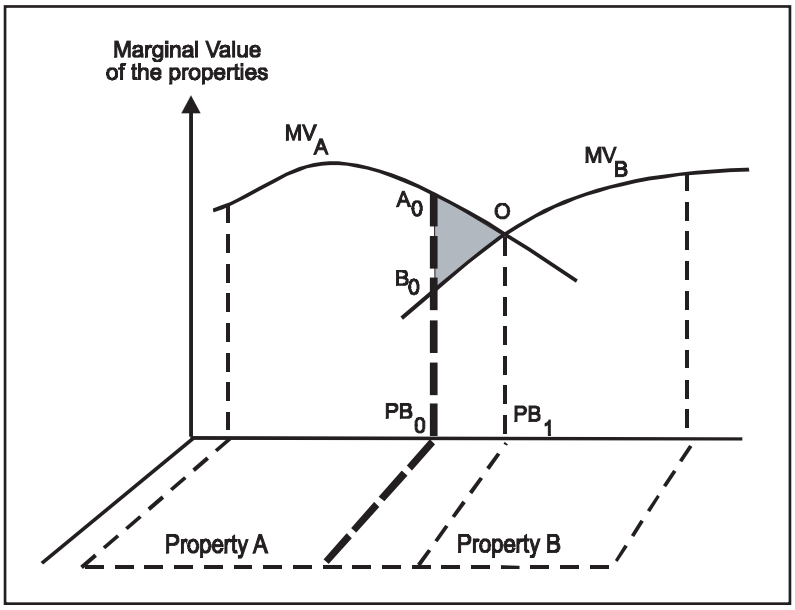


Figure 1. *The typical situation prompting the adjustment of property boundaries.*

On the existing property boundary, PB0, the marginal values of the properties are assumed to be different. The value for property A is greater than that for property B, cf. points A_0 and B_0 in the figure.

The property owners in this situation have an incentive for transferring land from property B to property A. If one square metre is transferred at a price between A_0 and B_0, both property owners will benefit from the transfer. Another square metre can be transferred if the price per sq. m. comes between the property owners' marginal curves, i.e. between MV_A and MV_B. In this way

land can go on being transferred until the property boundary has been shifted to PB_1, i.e. to point O, where the *marginal values of the two properties are equal*. By transferring the property boundary from PB_0 to PB_1, the value of property A will be increased by an amount represented in the figure by the area $PB_0A_0OPB_1$. The boundary adjustment, however, will reduce the value of property B by an amount corresponding to the area $PB_0B_0OPB_1$. The difference between the appreciation of property A and the depreciation of property B is the profit accruing from the boundary adjustment. That property is represented by the area B_0A_0O, which is shaded in the figure.

A number of conclusions can be drawn from this example. There is an *optimum position* for the property boundary. The boundary should be located where the marginal values of the properties are of equal magnitude. This boundary will be optimal until the marginal values of the properties again come to differ, e.g. as a consequence of social change or a change in the use which the properties are put to. But the boundary does not need to be put in the optimum position, PB_1, in order for the land transfer to be *profitable*. There will be profitability so long as the appreciation of property A exceeds the depreciation of property B. In order, then, to achieve a profitable land transfer, the new property boundary must be positioned within a certain interval. Finally, we may note that this example furnishes no guidance concerning the allocation of profit between the property owners, i.e. the *price* to be paid for the land. The price will depend on the negotiating skills of the parties, ethical preferences and other factors, matters to which we will be returning in section 4.

The above example, of course, is a simplification in certain respects. A completely optimal property formation is harder to achieve on more realistic terms. Firstly, it is hard in practice to estimate the marginal values of properties accurately. At best one can establish that the marginal value comes within a – not too large – interval. This in turn means that there is no specific, optimal boundary line: the "optimum" boundary also comes within an interval (see Kalbro and Sjödin, 1993). Secondly, the occurrence of *transaction costs*. I am aware that there is no general acceptance of how to define the term "transaction cost", see e.g. Allen, (1999, p 893) in his overview of different academic views on the concept:

> Few words in the economic language have been more abused or fought over and this is shown to result from the emergence of two distinct definitions and uses. The "neoclassical" definition rests on the costs of trading across a market, while the "property rights" definition centers on the costs of establishing and enforcing property rights.

However, it is not the aim of this paper to discuss different interpretations of transaction costs. Therefore we can simply observe that there are costs and inconveniences of effecting a market transaction. In our case the costs include the property owners having to determine the location of the new boundary, the boundary having to be marked out, maps having to be drawn, negotiations

conducted concerning the price to be paid for the land, and so on. Thus, in order for the property owners to be interested in moving the boundary to the optimum position, PB_1 in figure 1, the transaction costs have to be less than the total increase in value, i.e. the appreciation of property A less the depreciation of property B. Otherwise the land transfer will be unprofitable, in which case the property owners will leave the boundary in its original position, PB_0. Once the concept of transaction costs has been introduced, the "benefit" or "profit" from the boundary adjustment will be the total rise in value minus the costs. Here we can see that the magnitude of the transaction costs has an important bearing on the achievement of a suitable property formation. The higher the transaction costs, the less efficient the property formation can be expected to be.

This conclusion is in line Webster and Lai (2003), who present an urban theory that, to a large extent, is based on the concept of transaction costs. The theory contains four propositions, of which the first – called the "subdivision rule" – in general terms formulates the relationship between land values, transaction costs and property formation in our example above.

> Any particular configuration of property rights over a resource is a function of the value of the resource and the costs of assigning effective property rights. The latter includes the cost of technology required to make the resource excludable. If the value of a resource rises, or the cost of assigning property rights to a valued resource falls (due to technological or institutional innovation), there will be a demand for a reassignment of property rights (p. 11).

Analysis in order to reduce transaction costs are now used in many research areas. Planning and land development has been analysed by e.g. Alexander (2001), Webster & Lai (2003). Needham & de Kam (2004) have empirically tested the significance of transaction costs in exchange of land between suppliers and demanders. The multinational project[2], *Modelling Real Property Transactions*, aims to provide a stronger basis for the reduction of costs of real property transactions (Stubkjaer, 2003) and e.g. de Vries, Lewis & Georgiadou (2003) focus on the costs of land registration.

3 Legal provisions for formation of real property

As was mentioned by way of introduction, the property formation procedure in many countries is subject to legislation, in which case property owners cannot decide for themselves what their properties are going to look like. In Sweden, for example, changes in property formation resulting from subdivision, reallotment etc. have to be approved by Cadastral Authorities.

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[2] Countries taking part in the project are Austria, Denmark, Finland, Germany, Greece, Hungary, Latvia, The Netherlands, Slovenia, Spain, Sweden and United Kingdom.

In this respect the Authorities have to apply provisions of the Real Property Formation Act, Chapter 3. Here are some examples. Property formation shall be carried out in such a way that every property unit formed or re-formed will, in terms of location, extent or other conditions, be enduringly suited to its purpose (section 1). Property formation may not take place at variance with plans or regulations (section 2). Properties for agriculture should be of such size, composition and design that it can yield an acceptable economic return (section 5). Land intended for forestry may not be divided in such a way that the possibility of utilising the forest suffers an impairment of any significance (section 7).

The prime reason for passing legislation to regulate property formation is the occurrence of what are called *external effects*. Primarily, a boundary adjustment affects the property owners, but it can also affect other individuals without the property owners having cause to allow for this in the agreement they conclude. These external effects are of two possible kinds. Negative effects, such as environmental impact and aesthetic disturbance, can make the socioeconomic value of a change less than the private value for the property owners. On the other hand there may be positive external effects, such as the possibility of using forestry land for recreation, making the socioeconomic value of the property greater than its private economic value.

This, recalling our previous argument in terms of economics, can be expressed by saying that society's marginal value curves may differ from those of the property owners. This point is illustrated below in figure 2, which is a variant of figure 1.

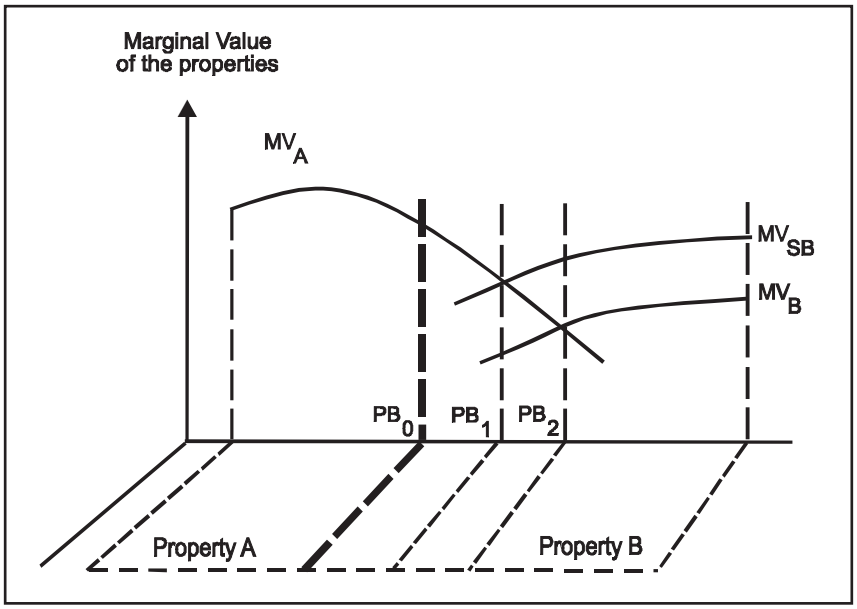

Figure 2. *Prompting the adjustment of property boundaries, society's marginal value curve included for the property B.*

The existing property boundary is at PB_0. If the property owners themselves are allowed to decide, the property boundary will be moved to PB_2, where the marginal value curves MV_A and MV_B intersect. At the same time we assume the socioeconomic value of property B to be greater than the value put on it by the property owner. Society's marginal value curve for the property B, MV_{SB}, will be greater than MV_B. (For the sake of simplicity we shall assume that the property owner and society put the same marginal value on property A.)

Society's marginal value curves for properties A and B intersect at point PB_1. In society's view, then, the existing property boundary should be adjusted, though not to the extent the property owner themselves think it should. An example is developed land bordering on a forest. The owners have agreed to enlarge the plot, but society may have cause to oppose excessively large plots, considering that neighbouring properties, for example, may be particularly valuable on account of agriculture or forestry, fauna or their attractiveness as a recreation area for the general public.

One reflection to be made from a Swedish perspective is that legislation on property formation has been relatively restrictively applied. Even where there has been agreement between the property owners, it has been difficult, for example, to form excessively large plots for building development, or to enlarge existing plots, on farmland and forestry land. Changes in the law coupled with test cases, however, have produced some relaxation of these restrictions. The reason for the change may of course be that the authorities consider the socioeconomic values associated with agricultural land and forestry land to have become less important. Alternatively, the socioeconomic values have been overestimated previously. However this may be, from an economic viewpoint we can say that the "gap" between property owners' and society's valuation of land is tending to diminish in some situations.

4 Compulsory purchase

Forcing someone to surrender land against their will is of course a powerful incursion on the individual right of ownership. Accordingly, there have to be very good reasons for building up legislation sanctioning this kind of coercion. In Europe and other countries, one fundamental legal prerequisite is that compulsory acquisition may only be prompted by purposes which are *in the public interest*. A fundamental legal rule concerning compulsory purchase is to be found in the European Convention for the Protection of Human Rights and Fundamental Freedoms.[3]

> **Article 1.** Every natural or legal person is entitled to the peaceful enjoyment of his possessions. No one shall be deprived of his possessions except in the

[3] Protocol March 20th 1952, Article 1.

> public interest and subject to the conditions provided for by law and by general principles of international law.

A number of criteria can be put forward concerning the definition of "public interest" (cf. Miceli and Segerson, 1999). Firstly, the compulsory purchase should be *socioeconomically justified* – the benefits of the acquisition must outweigh the drawbacks.

Furthermore, the purchaser must need to buy *a specific area of land*, i.e. there must not be any other (realistic) localisation options for the purpose of the acquisition. This can be instanced with land for roads, railways and power transmission lines. When a specific area of land is needed for a certain purpose, this puts the seller in a monopoly position *vis-à-vis* the purchaser, and thus a position of great strength from which to negotiate. The seller can then force the purchaser to pay a higher price than would have been the case with two or more rival sellers. Compulsory purchase can thus be justified by the seller happening to possess land in a strategic location. In other words, regulating the price to be paid is a vital motive for expropriatory legislation.

The seller being in a monopoly position is a necessary – but not sufficient – reason for allowing compulsory purchase. In addition, the purpose of the acquisition must, in general terms, be "important". It is a debatable point which purposes are important, but a minimum requirement would seem to be for the purpose of the acquisition to be of importance, directly or indirectly, to a not unduly small group of people.

Coercive rules may also be a means of reducing transaction costs. Negotiating costs etc. involved in engineering agreement between many property owners can be considerable, especially in cases which involve many property owners, such as thoroughgoing land consolidations of, say, farm and forestry properties. Excessively high transaction costs could result in essentially profitable measures failing to materialise. Those costs can be reduced through a more efficient decision-making process defined by law.

4.1 Swedish legislation

Swedish law contains many special enactments regulating expropriation or compulsory purchase. However, there are two laws of pivotal importance where compensation is concerned, namely the *Expropriation Act* and the *Real Property Formation Act*. These define two basic principles of compensation which also apply to compulsory purchase by authority of other legislation.

The basic idea behind the rules of compensation in the Expropriation Act is that the party forced to surrender land shall be left in the same economic position as if the compulsory purchase had never happened. The property owner shall be compensated for the damage he suffers, and in this sense compensation can be said to be based on a principle of indemnification. The main rule is for the compensation to correspond to the *market value* of the property, i.e. the price

which it would fetch in the open market. When only part of the property is affected by compulsory purchase, the compensation must equal the *loss* of market value which the compulsory purchase entails.[4]

Changes in property boundaries come under the *Real Property Formation Act*, e.g. *reallotment* of property units can be brought about by transferring an area of land from one property unit to another or forming what are known as official easements. Reallotment can, under certain conditions, be undertaken against property owners' wishes. In practice, the procedure is very often employed as an alternative to compulsory purchase, under the Expropriation Act and other special enactments.

The Real Property Formation Act also provides for compensation to be paid primarily for the loss of market value which the reallotment entails in the properties concerned.[5] The rules of compensation, however, distinguish between two different instances. If the reallotment is of an "expropriatory nature" the rules of the Expropriation Act apply. This is primarily the case with a transfer of land which is designated for a public/municipal purpose (roads and green spaces) in a Detailed Plan and all other situations in which compulsory purchase was an option based on the Expropriation Act or special enactments.

Other cases which are *not* expropriatory, i.e. which primarily concern relations between individual persons, are, in practical reality, many in number and anything but a residual item. Particularly frequent cases include *plot formation* for the purpose of creating or enlarging properties intended for building development. Cases of this kind also include the creation of easements in order to provide the plots with necessary roads, utilities etc.[6] Also reallotment of agricultural and forest properties, i.e. land transfers and changes in the easements and joint property unit shares of properties in rural areas, are labelled non-expropriatory.

In these cases the Act lays down that the seller is to be compensated for the reduction of market value. But in addition, when fixing the compensation, reasonable allowance shall also be made for the value of the land to the buyer. It may therefore be of interest to see how the term "reasonable allowance" has been construed in Swedish case law.

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4 If this compensation does not fully cover the economic injury to the property owner, compensation shall also be paid for what is termed other damage. Compensation for "other damage" may come into question, for example, when a property owner has to move house or close down a business conducted on the property.

5 The *Real Property Formation Act*, Chapter 5, Section 10 a.

6 The same applies to land for communal facilities (*gemensamhetsanläggning*), which are facilities common to several property units and managed by the property owners themselves. Facilities of this kind come under the *Joint Facilities Act*.

4.2 Swedish case law on compensation in connection with plot formation

The case law applicable to plot formation is based on the *average value principle*. This was already laid down by the Supreme Court in 1956, in an expropriation case concerning the acquisition of two properties which were to be turned into a plot for building development. The point at issue was how the value of the intended plot was to be allotted between its (differently owned) constituent parts. The Supreme Court ruled that a uniform value must be put on all developed land, regardless of where on the plot the building development was to be sited. A vital reason for distributing the new plot value *equally per square metre* was that a plot could not be built on at all until it conformed to an existing property subdivision plan.

What exactly does this principle imply? Let us consider it with the aid of an example, shown in figure 3.

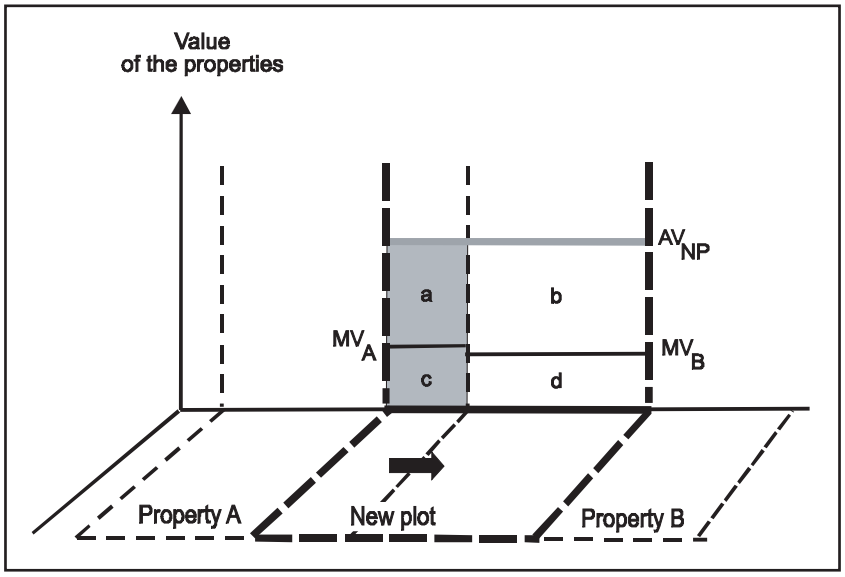

Figure 3. *An example of the average value principle.*

Two properties, A and B, are to yield land to a new plot. The marginal values of the two properties within the plot – before the plot is formed – are MV_A and MV_B respectively (for the sake of simplicity, we will assume that these marginal values are constant). The average value of the new plot is represented by the line AV_{NP}. Thus the total benefit from forming the plot is AV_{NP} minus MV_A and MV_B, , i.e. the benefit corresponds to the area a+b.

In reallotment, if the property owners disagree concerning the price, the average value principle also means that the *compensation* payable to the person surrendering land must equal the average value of the new plot per square metre, multiplied by the area of the land transferred.

In our example, then, the compensation payable to the owner of property A will correspond to the area a+c (shaded in figure 3). Given this compensation, the total benefit (profit) will be divided between the two property owners as follows. The profit on property A corresponds to the area a – compensation (the area a+c) minus the value of the land in A prior to the formation of the plot (area c). The profit on property B is represented by area b – the value of the new plot (a+b+c+d), minus the compensation (a+c) and minus the value of the land in B prior to the formation of the plot (area d). We may note that, if the properties were of equal value per square metre before the plot was formed, the profit will be allocated proportionally to the area of the properties within the plot.

A number of conclusions can be drawn from this example. Both property owners receive a share of the profit. In other words, the property owners are credited with the appreciation of the land they own before the plot is formed. It should also be noted that the average value principle is "neutral", in the sense of it making no difference which of the property owners acquires the new plot. In our example we assume it is the owner of A who surrenders land. But from the point of view of profit allocation the effect will be the same if the reverse applies and property A surrenders land in return for compensation matching its average value.[7]

4.3 Is case law "fair and reasonable"?

Certain rules of compensation were reformed in 1993. Among other things, the scope for allocation of profit was widened. In this connection, practice was clarified by the Real Property Formation Act, the *travaux préparatoires* of which lay down that the compensation should correspond to the price that could have been expected if it had been a *normal voluntary transaction.*

As we saw in section 2, the price, where there is a voluntary agreement, must come between the values placed by the property owners on the land to be transferred. But how is the price determined and how is the profit apportioned in actual practice. Here it has to be admitted that our knowledge of price formation in different situations is limited, i.e. there is great uncertainty regarding the appropriate level of payment. However, some researchers have tried to shed some light on this problem.

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[7] Compensation matching the average square metre value of the land cannot, however, be applied in every situation, because the results could be unreasonable. In these cases there are exceptional rules based on the principle that the person surrendering land must never be compensated for less than the value of the land before the reallotment, while the price paid by the person obtaining land shall not exceed the appreciation occurring. These exceptional rules mostly come into play when land is to be transferred to or from a property which has already been developed. Space will not allow us, however, to analyse these cases, one of which has been much debated and was the subject of a Supreme Court decision.

Trefzger and Munneke (1998) show how bargaining theory and game theory can be used as a starting point to decide compensation, particularly regarding valuation of easements. From this theory they suggest that the surplus which, for example, an easement gives rise to will be split equally between the parties. If an equal split were to be a "universal" rule of apportionment, the Swedish average principle would go against it, because, as we have seen, the average value principle makes the apportionment of profit dependent on the sizes of the properties and on their value for the formation of the plot.

Lind, Kalbro & Sonnegård (1996) and Kalbro & Lind (1999) have performed a number of bargaining experiments concerning voluntary agreements about the price for land transfers, creation of easements etc. The results are summarised as follows:

> In each situation there exists a limited number of culturally determined principles of a fair division of profit. From these the buyer and the seller choose the principle which, in the specific situation, gives them the largest share of the profit. The final division of profit is the result of a compromise, where the parties, on average, meet about half-way. Buyer and seller argued from moral principles, but they chose principles opportunistically (Lind, Kalbro & Sonnegård, 1996, p 1).

One important conclusion from these studies, then, is that there is no single profit allocation principle which can be applied to every situation. But the studies do support the main rule that compensation is to match the average value of the new plot (at least, so long as the square metre values of the properties prior to the formation of the plot are more or less equal).

An empirical study of the prices paid in connection with voluntary transfer of land to developed land has been made by Tenkanen (1984). One of the findings in which can be summed up as follows:

> If neither part of the complete site could be independently built (or otherwise effectively used), the unit price for a part of the site would be the same as that for the complete site.[8]

Every square metre of the new plot, then, was deemed to be worth the same amount. I take this to mean that the parties, in Swedish terminology, apply the average value principle to voluntary agreements. This being so, existing Swedish practice is "reasonable".

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[8] If the buyer's part could be independently built, which was normal in case of a waterside site in the country, the unit price for an additional area would be normally 30-50 % of the current unit price for the complete site. The percentage grew according to the share of the area to be purchased compared to the area of the complete site.

5 Concluding remarks

The purpose of this article has been to present economic models for the understanding and solution of practical problems connected with real estate formation. Models of this kind can, of course, provide openings and/or starting points for further empirical studies (as witness, for example, Nordic studies by Tenkanen and by Kalbro & Lind). My experience of legislative work also tells me that theoretical background knowledge of this kind plays a useful part in clarifying various problems. Theory is an important aid to the framing of new legislation and to the evaluation and revision of existing laws. Law and economics are closely intertwined, at least in the sphere of property law.

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