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Author(s): R. W. Archer

Source: *Urban Studies*, October 1973, Vol. 10, No. 3 (October 1973), pp. 367-372

Published by: Sage Publications, Ltd.

Stable URL: <https://www.jstor.org/stable/43194618>

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Notes and Comments

Land Speculation and Scattered Development; Failures in the Urban-Fringe Land Market

R. W. Archer

[Received January 1973]

One of the main causes of the sprawl around North American cities, and to a lesser extent around Australian cities, is scattered development through 'leapfrog' residential subdivisions. One of the main causes of this scattered development is land speculation whereby land is purchased and held for resale at a later date at a higher price. Farmers and developers can also act as speculators by withholding their land from development waiting for higher prices. These landowners hold their land out of the current market so that land and building developers have to bypass it and homebuyers have to travel further afield to purchase new housing. This extra distance generates extra costs, by way of increased development, operating and travel costs. Land speculation also accelerates the rise in land values by the initial increase in speculative demand and the subsequent reduction in the effective supply of land for building, so that the current prices of homesites are increased. Land speculation is usually condemned because it causes a scattered pattern of urban development and land use, and increases the current prices of homesites.¹

This note presents data from a U.S. case study which shows that landowners holding their land out of the market and receiving an increase in value averaging \$129 per acre a year were generating social costs of \$1,360 per acre a year which they did not pay. This case study data is then analysed to ascertain why the land market failed to co-ordinate the conversion of rural land to urban uses in an efficient way. The analysis focusses on the roles

The author is Hon. Research Director, Metropolitan Research Trust, Canberra.

of the landowners, the developers and the homebuyers in the land conversion process. It is concluded that the main sources of market failure were: the pricing policy of the commercial service and public utility organisations, the apparent failure of homebuyers to correctly estimate the travel cost differentials between alternative homesites, and the market uncertainty facing landowners.

The data used in this analysis has been developed from a comprehensive case study of the 200 acre 'Gainesway' subdivision near Lexington, Kentucky, made by Roy W. Bahl in 1962.² All the figures cited are in U.S. dollars at 1962 price levels.

The costs of a leapfrog subdivision

The 'Gainesway' subdivision studied by Dr Bahl was located along the Tate's Creek Pike two miles south from the edge of the built-up area of Lexington and 4.5 miles from the city centre. The developers had to bypass five vacant land tracts suitable for residential development along the highway. They began development in 1957 and eventually acquired about 450 acres, but at the time of the study were developing about 200 acres. By October 1959, some 116 houses had been constructed and occupied, and at the time of the study in 1962 some 337 houses were occupied by about 1,240 persons. There were an average of 3.7 persons and 1.37 vehicles per household and the subdivision has been described as a 'higher' middle income housing area (Mays and Gibbs, 1962).

The City of Lexington had a resident population of

¹ See Clawson (1962); Harvey and Clark (1965); McBride and Clawson (1970); Schmid (1970).

² See Bahl (1963). Dr Bahl kindly made additional data from the study available to the present writer.

62,810 persons in 1960. Many of its suburbs were in Fayette County and the Lexington urban area as a whole covered 27.2 square miles with a population of 111,940 persons and 35,327 dwellings. Over 30% of these dwellings were less than 10 years old (Bureau of the Census, 1963). The subdivision was located within the city boundaries.

Whereas most studies of the cost of urban sprawl focus on the utility and/or municipal costs, Dr Bahl was able to include motor vehicle transport costs in his study from an origin-and-destination traffic study of the subdivision carried out in September 1959 which provided basic transport data (Mays and Gibbs, 1962). He measured and calculated both the additional capital costs and the additional operating costs generated by the two miles of extra distance for 14 separate items in the three broad categories of utilities, municipal and postal services, and transportation. The interest and depreciation charges on the additional capital works were combined with the operating costs to give the additional current cost per annum for each item for the year 1962.

His figures relate to the specific experience of the 'Gainesway' subdivision. The present writer has amended some of these figures to obtain a less unique cost structure. Thus, whereas Dr Bahl included the costs of a new fire station, the construction of which was precipitated by the subdivision, they have not been included here. The water main extension has been costed for a full 10,560 foot extension instead of the actual 8,500 foot extension required and the full cost of the sewerage treatment plant was included (but at less cost than a mains extension). The present writer was also able to use later research data on motor vehicle running costs which gave a figure of 7.0 cents per mile as the average running cost in 1962 of a four-door sedan with a 100,000 mile and 10 year life. This amount covers the petrol and oil (1.64 cents), replacement tyres and tubes (0.18 cents), repairs and maintenance (1.72 cents) plus sales taxes (0.97 cents) and depreciation (2.54 cents) (Baerwald, 1965). It does not include garaging and parking (1.08 cents), insurance (1.29 cents) or hire purchase or notional interest costs, etc. The present writer has also recalculated the estimated number of vehicle miles travelled, with the effect of reducing them somewhat.³ Finally, the rate of interest used to calculate interest charges has been increased from 2.5% to 5.0% p.a.

The findings of the 'Gainesway' leapfrog subdivision

study as varied by the present writer are summarised in Table 1. The main points of interest are:

- (i) The total additional annual money cost generated by the two mile leapfrog subdivision was \$272,534 for 1962. This represented a money cost of about \$220 per annum for each resident, or about \$810 per annum for each house, or about \$1360 per acre per annum for the 200 acres being developed.
- (ii) The additional motor vehicle travel costs generated by the two mile leapfrog development were the dominant cost items. This was so even though no value was placed on the extra travel time of drivers and passengers. The running costs of private motor cars represented 63.2% of the total additional annual costs, the commercial delivery costs 20.1%, and the four transportation items together amounted to 84.5% of the total additional annual costs. Some of these additional travel costs were temporary—a shopping centre and school were eventually built nearer the subdivision.
- (iii) Most (63.2%) of the additional money costs were paid for by the residents of 'Gainesway' as car owners. Some 29.7% of the total additional costs were paid for by all the consumers of the private business services provided to 'Gainesway' residents at higher cost because the firms and organisations providing these services did not impose higher prices or charges on the residents to cover the extra costs. Only 6.6% of the additional money costs were paid for by city and county taxpayers.
- (iv) The additional capital costs generated by the sprawl development came to a large amount at \$234,681. However, much of this was only a temporary additional cost because it was excess capacity in the utility network which would be used when the intervening land was developed. The sewerage treatment plant could be a long-term additional cost.

Land values and property taxes

Dr Bahl also assembled data on the level and trend of broadacre land values near the subdivision during its development and the assessment valuations placed on these lands.

The land fronting the two miles of highway between the subdivision and the built-up area was held in five land parcels covering 534 acres. Its value increased from an average of \$2,573 per acre in January 1956, to \$3,479 per acre in January 1963: an average increase of \$129 per acre per annum. The appraisers who made the study of

³ The 24 hour cordon count carried out on Tuesday, 29 September 1959, showed 598 passenger car and 327 commercial vehicle round trips. (The 24 hour cordon count on the previous Saturday showed a total of 1,005 car and commercial vehicle round trips.) The 598 passenger car round trips indicates an average of 5.155 round trips per house per day. (This figure seems to be rather high to the present writer but no alternative base figure is available.) If it is assumed that five round trips per day were made for the 337 houses occupied in late 1962 this would mean 1,685 round car trips per day and 6,740 additional car travel miles per day.

In the case of the 327 commercial vehicles round trips recorded, some of these would represent vehicles travelling to building sites and some already included in the other cost items (postal services, police services, etc.) Also, much of this traffic would not increase with the number of occupied houses in the subdivision. Therefore, it has been assumed that one-third of this traffic would increase directly with the number of occupied houses, with the remaining 218 commercial vehicle round trips per day remaining constant. On this basis there would have been 535 commercial vehicle round trips per day in 1962 and they would have travelled an additional 2,140 miles per day to visit the subdivision.

Table 1
Summary table of the additional costs of a 200 acre 'leapfrog' residential development near Lexington, Kentucky, U.S.A. as at 1962

Item	Additional costs		Total Additional costs per annum (\$)	Who paid these additional costs	Percentage of total cost
	Capital Works (\$)	Interest and Depreciation per annum (a) (\$)			
Water (b)	45,079	3,155	8,766	Consumers, Lexington area	3.2
Gas	10,609	1,013	1,013	Consumers, Lexington area	0.4
Telephone	44,960	4,046	13,931	Consumers, statewide	5.1
Electricity	11,250	937	937	Consumers, statewide	0.3
Sanitary sewage (c)	122,783	8,596	9,016	City taxpayers	3.3
Refuse collection	—	—	638	City taxpayers	0.2
Fire protection (d)	—	—	208	City taxpayers	0.1
Police protection	—	—	7,425	City taxpayers	2.7
Mail service	—	—	374	Federal taxpayers	0.1
School bus service	—	—	737	County taxpayers	0.3
Commercial delivery services (e)	—	—	54,677	Consumers, Lexington area	20.1
Automobile commuting (e)	—	—	172,207	'Gainesway' residents	63.2
Bus commuting	—	—	2,483	60% by consumers, Lexington area 40% by 'Gainesway' residents	0.6
Road and street maintenance	—	—	122	County taxpayers	0.0
Total	234,681	17,747	272,534		100.0

Source: Based on a study by Roy W. Bahl (1963) *A Bluegrass Leapfrog* (Bureau of Business Research, College of Commerce, University of Kentucky, Lexington, Kentucky, p. 27) with the following changes:

- (a) Interest calculated at 5% p.a.;
- (b) water costs calculated on a 10,000 feet mains extension;
- (c) sanitary sewage calculated on the full cost of the treatment plant (at less than the cost of a mains extension);
- (d) fire protection calculated as \$4.00 per week; and
- (e) Vehicle running costs calculated at 7.0 cents per mile on 2,140 miles of additional commercial vehicle travel per day and 6,740 miles of additional car travel per day

market values also found that the percentage increase was similar for the five properties at 35%. The 175 acre land parcel next to the built-up area was valued at \$3,277 per acre as at January 1956, and \$4,429 per acre in January 1963; an average increase of £165 per acre per annum.

Therefore, the five landowners who held their 534 acres out of the market and received an increase in land value averaging about \$129 per acre each year were generating additional social costs which they did not pay of about \$1,360 per acre each year on the 200 acres used in the subdivision. These costs were not transfer payments, they were the value of the resources used in the additional transport, the additional operations and the additional capital works needed.

During the study period the land was substantially under-assessed for property tax purposes because it was assessed as rural-use land rather than as urban development land as per its market value. The assessed value of the 534 acres in 1956 was only 5.2% of its estimated market value compared with the county-wide median assessment ratio of 31.6%, and the assessment ratio for the five land parcels ranged from 2.50% to 7.95%. In 1963 the 534 acres was assessed at only 3.84% of its estimated market value (with the separate land parcels ranging from 1.87% to 5.83%) compared with the county-wide median assessment ratio of 28.4%. This meant that whereas the 534 acres should have attracted property taxes averaging \$28.4 per acre in 1962 they paid only \$3.8 per acre.

One implication of this under-assessment of urban-fringe broadacres was that the local government authorities at Lexington received very little increased property tax revenue from the increase in land values which the scattered urban development generated and extended.

Market co-ordination of decisions

It is possible to use this study data to examine the decision-making situation of the participants in the rural-urban land conversion process and to identify reasons why the land market failed to co-ordinate their decisions so as to ensure an efficient conversion process.

An efficient land market would guide the decisions of the landowners as sellers and the developers and households as buyers with land prices which would balance costs and benefits. The pattern and movement of urban-fringe land prices would guide the location and timing of development so as to reflect the relative advantage of each land parcel. This relative advantage would be determined by the availability of services, proximity to markets, subdivision costs, prospective residential amenity, etc. of each land parcel.

In an efficient land market the landowners would be confronted with the full social value of their land for current development by the top price offered by developers. If the landowner chose not to sell but to hold the land for later sale at a higher price then this would be a correct decision for him if he eventually receives a price which recovers the current price plus his holding

costs (calculated as the alternative use return on his funds) plus a profit for his risk taking. It will also be a socially correct decision because he has reserved the land for a future land-user who values it more than a current land-user. Clearly, some speculative withholding of land from current development is desirable because it reserves the land for later more intensive and valuable land uses such as higher density housing, business activities, etc., which require locations in built-up areas.

The landowner will only be able to make a socially sound decision to sell or hold (or to develop now or later) if he is confronted with the full social value of his land for immediate development. The developers will offer him this price if they are confronted with the full cost and revenue advantages of this land and are then obliged to offer it as a land price, either through the pressure of competitive offers from other developers or through the landowner's refusal to sell at a lesser price. The developer's estimate of the revenue advantage of the land (i.e. its market value as building sites) will be determined by the extent to which the homebuyers are confronted with the full location cost advantage of each homesite and are obliged to pay for it through its market price.

This outline indicates that the land market will only ensure the efficient use of urban-fringe land if the landowner, developer and homebuyer participants in the market are confronted with the full costs and benefits of their respective decisions.

In the case of the 'Gainesway' subdivision the analysis of the market situation requires some conjecture because the information available on the alternatives open to the participants is incomplete.

In the case of homebuyers who purchased houses in the 'Gainesway' subdivision, they would be guided in their purchase decision by the additional costs to them of a house at this location. These would be the extra travel costs (by way of car running costs, bus fares and travel time) plus the disadvantage of a lower provision of services, less the probable lower cost of a house site in the subdivision. In the case of the latter item, Dr Bahl could not find any clear evidence of the extent to which the 'Gainesway' houses were cheaper than similar houses at other locations around Lexington. The developer may have adopted the alternative approach of promoting it as an exclusive estate and providing additional amenity features.

The homebuyers purchased houses whose location generated additional annual money costs of about \$810 per annum each. However, as shown by the data in Table 1 they were confronted with only \$510 of this as a money cost to themselves and as they were unaware of the remaining amount of \$300 per house per annum they would ignore it as a locational cost.

The \$510 a year additional money cost to the homebuyers was paid as additional car running costs. However, the homebuyers may have estimated these additional costs at much less than \$510 per household a year, depending on how they perceived their additional car running costs. If they calculated these costs as only

the extra cost of petrol and oil at about 2.35 cents per mile rather than the amount of 7.0 cents per mile (which included repairs, replacement tyres, depreciation, etc.) then they would see the additional monetary cost of a house at the 'Gainesway' location as only \$170 a year. If this was the case, they might have seen the \$170 a year as being offset by the possible lower prices of the homesites or the possible additional amenity features in the subdivision.

In the case of the additional annual costs of \$300 per house that were not paid directly by the households in the subdivision, the main items were the additional costs of providing commercial delivery services at \$160 per house, telephone services at \$40 per house, sewerage service at \$27 per house, and water supply at \$26 per house. In each case the additional cost of providing these services to the 'Gainesway' subdivision were borne by the consumers of the service as a whole.

The fact that \$300 of the additional annual costs per house were not charged to the households and that possibly \$340 of the other \$510 annual cost per house were not recognised by the homebuyers means that these additional location costs would not influence their homesite location and price decision. In this case the developer could ignore most of the additional costs generated by the remote location of the subdivision in calculating the potential sale price of the homesites and the corresponding maximum offer price for the raw land. The maximum price which the developers would offer for the five land parcels along the highway would therefore decline only slightly in relation to their distance from the built-up area.

The five landowners who held their 534 acres out of the market cannot be regarded as farmers waiting for a price sufficient to compensate them for disturbance, etc. because the market value of the land was already six or seven times its farm-use value. The five landowners can be regarded as *de facto* speculators whose decisions not to sell were guided by their expectations of future increases in land prices. The developer was not able to offer them prices which reflected the full locational advantage of their lands relative to the subdivision land. If the developer had increased his offer prices such offers might not have induced sales but simply confirmed the landowners' expectations of rising land prices and caused them to revise their expectations upwards. Further, if the landowners intended to re-invest their land sale proceeds in other land then they might have seen little point in selling their existing holdings at the time the developer was buying.

It is not known what increases in value the landowners expected, but their land did increase in market value by an average of about \$129 per acre per annum. After annual property taxes of about \$3.10 per acre were deducted this left them with a return of about \$126 per acre per annum which represented an average return on their capital of less than 5% p.a. Although the landowners may have also received a farm income from their land this would have provided a low rate of return on the market value of their land, which was about seven times

its farm-use value. If they were using loan funds to finance their landholdings and had to pay interest charges then their net return could have been negligible. As the return that the landowners realised on their land investment averaged less than 5% p.a. when the yield on tax-exempt bonds with an Aaa rating was 3.0-3.2% p.a. and when there was a degree of inflation, their speculative land proved to be an indifferent investment during the period 1956-62.

Although the landowners were not confronted with the full economic value of their land by price offers which reflected its full location advantage, their decisions not to sell their land were apparently due to their expectations of future land price rises. The expected rises did not eventuate and their incorrect decisions can be attributed to market uncertainty.

Conclusions

The findings of this study cannot be regarded as conclusive. The real value of Dr Bahl's comprehensive case study is that it provides data on the working of the urban-fringe land market which directs attention to the key problem areas. Obviously more research is needed on the homebuyers' location decisions to identify their knowledge and consideration of the travel costs arising from alternative home locations. In the case of the landowners who hold their land out of the market, information is needed on their expectations and intentions, and on their cash and perceived holding costs.

The study also raises questions about possible approaches towards correcting the failures of the land market. The basic requirement for an efficient land market is that the participants should be confronted with the full social costs and benefits of their decisions and preferably obliged to bear and receive them. This principle would suggest that the firms supplying utility and other services to houses in remote subdivisions should impose an additional charge which reflects the additional costs of supplying them with services. However, this would not be administratively practicable for many firms. The same purpose could be achieved by the imposition of an annual property tax levy on homesites in remote subdivisions at an amount calculated as a measure of the additional cost of supplying facilities and services to houses in the subdivision.

In the case of the homebuyers who do not correctly assess the car travel costs differentials between houses at different locations this imperfect knowledge could be reduced by carrying out case studies and publicising the findings.

In the case of the landowners who hold their land out of the market they should not be granted property tax concessions which reduce their cash holding costs and subsidise them relative to other property owners. The adoption of a land value property tax system in preference to an improved value system would also increase their cash holding costs as well as recovering a greater share of the 'unearned increments' in urban-fringe land values for governmental use.

In the case of local government the policy of assessing urban-fringe land on the basis of its farm-use value rather than its market value for urban development meant that the land was assessed at only 15% of its full assessment value.⁴ This cost local government significant property tax revenues, at an average rate of \$24.6 per acre in 1962, as well as encouraging the landowners to hold their land out of the market. When land prices were rising by an average of \$129 per acre a year the tax concession of \$24.6 per acre would be a welcome subsidy. This tax concession also removed one of the pressures on landowners to keep their land in active farm use.

The data in Table 1 shows that only a small part (6.6%, an amount of \$18,146 in 1962) of the additional costs of the subdivision were paid through local government by taxpayers.⁵ This might explain why the local government authorities were apparently indifferent to the land speculation and scattered development taking place around Lexington. If they were indifferent, then they were adopting a short-sighted view because their city and county taxpayers were paying another 24% of the additional costs in their capacity as consumers of the services provided to the subdivision households on a subsidised basis.

⁴ This assessment policy has been imposed on local government authorities by the State legislatures in many of the U.S. States.

⁵ It was noted earlier that the present writer has omitted the costs of the fire station built in the subdivision. This cost the city taxpayers \$65,266 in 1962, calculated as \$61,000 in operating costs, and \$4,266 in debt service charges (at 5% interest).

Acknowledgement. This paper develops material originally prepared for the Maryland-National Capital Park and Planning Commission, Washington, U.S.A., and the Commission's support is gratefully acknowledged. The views presented are the personal views of the author.

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