The Indirect Effects of New Housing Construction in Developing Countries

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Summary. The aim of this paper is to examine the indirect effects of new housing construction on the redistribution of old housing stock in developing countries. The basic data for the study comes from the author's work in Tunisia, with comparative illustration from similar studies in Mexico, and is used to test a certain number of conclusions on filtering derived from empirical studies undertaken in developed countries. The conclusions are that dwellings in the middle range of values initiated the longest chains of moves, but that as even these chains end before reaching the poorest families, filtering strategies need to be complemented by a positive programme of slum-upgrading.

The concept of 'filtering' suggests that as well-to-do families acquire new homes, they will allow good but older dwellings to filter down to low income households. In less developed countries, where housing is scarce and of poor quality and where housing strategies are either incomplete or non-existent, a full knowledge of the consequences of new housing construction is necessary for the intelligent selection of a housing program. Developing countries must thus not simply build, but also anticipate and monitor the redistribution of the old housing stock. An understanding of the process of filtering is one of the basic inputs of a coherent housing policy.

The filtering and chains of moves or 'turnover' literature is relatively recent, but more and more abundant. Our objective is not to study the concept of filtering nor to compare the different definitions of this concept, but to explore the indirect effects of new housing construction in a less developed country in terms of its effects on the redistribution of old housing stock.

The analysis of the concepts of chains of moves can be approached in three different ways. Firstly, one may examine the sequences of moves which are generated as a result of the construction of a new housing unit. When new housing units are built or occupied for the first time, the families which move into them usually leave their former houses to be occupied by others, who in turn may free yet further homes, thereby creating a chain of moves. The effects and the importance of this filtering process can be observed by following through this succession of households and housing units. Such a sequence of moves usually starts whenever there is a vacancy, and may appear in one of three different ways: by the construction of new housing units, by the death or dissolution of a formerly existing family unit, or by the emigration of households.

Secondly, one may select part of a housing market area, such as a neighborhood, and examine the changes in occupancy which occur there through time.

Thirdly, one may select a household and trace the changes in housing which have occurred during its lifetime. Using this approach, the constant is not the housing unit, but the household.

Of these three approaches, the first seems the more complete since it allows us to study both moves between existing housing units, and the movement of households following a vacancy created by the construction of a new dwelling.

This approach has been used in a certain number of studies of cities in developed countries, mainly in the US.

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In developing countries it would seem that filtering does not touch large segments of the population. Turner (1973) wrote 'In cities that have recently been small and that have lately been swollen by large influxes of rural or small town migrants, there is little filtering down of the housing stock'. This is the point on which the following studies, carried out in LDC's cities, presented empirical evidence. The first survey on the chains of moves was held in Tunis by the author (1974). Two more studies were held in Mexico; the first in Chihuahua (Northern Mexico) by Yânez (1975), and the second in Mexico City, by Prentice (1976).

On the basis of our study in Tunis, and using the main findings of both Mexican studies for comparative purposes, we propose to trace the indirect consequences of new construction in developing countries. Our objective is to compare empirical measures of turnover vacancies in Tunis, Chihuahua and Mexico City, and for these three cities, to test a certain number of conclusions on filtering which are derived from empirical studies undertaken in developed countries. Our aim is also to see whether a housing filtering strategy based on a strict enforcement of high quality standards for all new construction and aiming to satisfy the housing needs of poor households indirectly, through filtering down of older units from higher income households, is appropriate to less developed countries.

In this article we will try to give specific answers to the following questions: What is the average length of the sequences of moves? For what reasons do the chains of moves end? Is there a relation between the length of the sequences of moves and the values of the new dwellings? What are the characteristics of the dwellings at different stages? What are the incomes of the households at different positions? And finally: Why do households move?

Our understanding of the general characteristics of the sequence of moves, and of our conclusions in general, will be greatly helped by a succinct account of housing conditions in Tunisia and Mexico. These are both middle income countries (World Bank, 1979), having an approximately equal level of development: GNP *per capita* is equivalent to $860 (US) in Tunisia and $1,120 (US) in Mexico.

Mexico is, however, much larger than Tunisia (respectively 1,973 and 164 thousand square kilometers) and is much more populous (respectively 63 and 6 million inhabitants). It also has one of the world's highest rates of population growth (3.3 per cent) whereas the Tunisian rate is only about 2.6 per cent per annum. In both countries population is rapidly becoming more concentrated in urban areas, the percentages of urban population being 63 for Mexico and 48 for Tunisia. At the same time, urban population growth is much higher in Mexico (4.6 per cent) than in Tunisia (3.6 per cent). Both capital cities (Mexico City and Tunis) house about 32 per cent of the total urban population, but Mexico City with its 12 million inhabitants is 12 times bigger than Tunis which has only one million inhabitants, and, at 5.6 per cent per annum, growing much faster than Tunis, which is growing at 3.6 per cent per annum.

These population pressures have put severe strain on housing conditions and supply in general, and in the urban areas in particular. Also, Tunisia and Mexico have both quantitative and qualitative housing deficits. Most dwellings are overcrowded: the number of persons per dwelling is high and is still increasing, from 4.9 in the 1960s to 5.8 in the 1970s for Mexico and from 6.15 to 6.8 for Tunisia during the same period. More than 45 per cent of the population of Mexico City is living in slums and in squatter settlements. In Tunis, the percentage of households living in 'gourbivilles' (squatter areas) is lower (about 25 per cent of the total). A large number of the dwellings are substandard. Though some are unsuitable for repair or improvement, most units have correctable deficiencies, most often the absence of bathroom facilities. The percentage of one- or two-room dwellings is relatively high (62 per cent in Mexico and 71 per cent in Tunisia).

In both countries, the present rate of construction of new dwellings is below the required rate based on actual needs (population growth, replacement goal and wiping out the deficit). Only 188,000 units per year instead of 300,000 units are built in Mexico and only 25,000 units are built in Tunisia instead of 56,000 units. In Mexico, in the past few decades about 70 per cent of all housing construction has been done by the 'unorganised' or 'do-it-yourself' sector. The organised sector's 30 per cent came from both public and private formal housing suppliers. Since 1972 the public agencies' share of total formal production is about 30 per cent. In Tunisia, the share of the informal sector is lower than in Mexico, but the public share of total formal production is higher, 52 per cent during the fifth plan (1976–81).

In both Mexico and Tunisia, low incomes, high prices of dwellings, and mortgage conditions have excluded a large number of households from the formal market of home ownership. These households could either rent sub-standard dwellings in squatter areas or build homes on a do-it-yourself, incremental basis.

General Characteristics of the Sequence of Moves

When a new dwelling is built in a city area it is occupied by a household belonging to one of the following categories:

(i) A household which was living in the city area and which has left a vacancy.
(ii) A household which has left no vacancy because it was either an immigrant (to the city) or a new household.
(iii) A household whose former dwelling was removed from the housing stock for various reasons.

Of these three cases, only the first creates a vacancy chain and therefore contributes to the filtering sequences.

The Length of the Sequences of Moves

The average length of chains indicates the magnitude of the indirect effects of new housing construction. We could estimate this rate by dividing the total number of households who moved by the initial number of new dwellings chosen in the sample.

This means that generally about two families take part in a chain of moves before it terminates; or, for each new dwelling built in the studied city area, approximately two vacancies are created in the existing housing market, including that of the new dwelling. If we assume that families only move when they are sure of improving their housing conditions, we may conclude that an average of two households benefit from each new dwelling built in the city area. However, the true number may be higher, and the sequence is longer than that of Table 1 if we take into account the number of interviews unfinished because the dwelling was still vacant or because no contact could be made with dwellings in a squatter area without a precise address.

In order to estimate the real length rate of the sequences of moves, we have to compute (as in Lansing, Clifton and Morgan, 1969) the different loss rates (ELR) at different positions.

The average length rate of the sequences of moves increases from 1.82 to 2.05 for Tunis, from 2.13 to 2.40 for Chihuahua and from 2.31 to 2.38 for Mexico City. The overall average increases from 2.09 to 2.24. This result therefore implies that the construction of 100 dwellings may result in the improved accommodation of 224 families of which 124 families moved to old dwellings.

If we compare our averages to the European and US ratios, we will find that it is within the range estimated in similar studies: City of Detroit (1971) 1.5; Sands and Bower for various types of new housing in the cities of New York, from 1.55 to 2.43 (Sands and Bower, 1974); Watson (1973) in West Central Scotland, 1.64 for public housing and 2.09 for private; Adams (1973) in Minneapolis-St Paul, 2.0 for public housing and 2.2 for private; Kristof (1963) in New York City, 2.4; and Lansing, Clifton and Morgan (1969) in all geographical areas of the United States, 3.5. Let us note that the larger our study area, the longer will be the chains of moves.

Table 1

The minimum length of the sequences of moves (Tunis, Chihuahua, Mexico City)

	Tunis	Chihuahua	Mexico City	All
Total number of completed interviews	182	64	270	516
Total number of new dwellings	100	30	117	247
Average length rate of the sequences of moves	1.82	2.13	2.31	2.09

Table 2

Number of dwellings in each position in the chain of moves (based on estimated loss rates)

	Tunis			Chihuahua		
Position	Number of dwellings	ELR (in %)	Loss	Number of dwellings	ELR (in %)	Loss
1	100	40	40	30	23.3	7
2	60	51	31	23	50	12
3	29	62	18	11	50	5
4	11	63	7	6	75	5
5	5	80	4	1	75	1
Total	205		100	72		30

The estimated loss rates (ELR) represents the dwellings that are withdrawn definitely from the chains of moves in each position.

Reasons for Ending of Chains of Moves

The length of the sequences of moves becomes more significant if we know why and how the sequences end. A sequence ends when it does not create a vacancy. This occurs for two main reasons: (i) when the dwellings in the last position of a sequence are occupied by people who do not leave any vacancy (recent migrants, recently formed households, someone still living in the previous dwelling); (ii) when the dwelling in the last position is removed from the housing stock (demolished or no longer used as a dwelling). Of course, the failure to establish contact with a household and the fact that the dwelling remains empty during the survey are other reasons for the ending of a sequence.

The most important reason why the sequences of moves end for Tunis and for Mexico City is that the present unit is occupied by a newly-formed household. This means a household which has left no vacancy because its last dwelling is still occupied by someone (parents or friends).

The second main reason why sequences end is that the previous dwelling has been removed from the housing stock. This means that the structure has been physically destroyed deliberately to clear the site for a new use (construction of a new residential area, building a road, a garden, a shopping centre, etc). It can also mean that the structure has been destroyed by rains or flood, mainly when the dwellings were made of low quality materials. Finally, some other dwellings have been converted into boarding houses, commercial stores or into offices.

The third main reason why the sequences of moves end is that the household are immigrants from outside the study area. Although the occupation of dwellings by migrants results in the end of the sequences of moves in the study area, it is certain that a number of these migrants left houses vacant thus initiating new sequences in other cities.

We notice that the sequences of moves end for the same reasons in both Tunis and Mexico City. As a matter of fact, if we only take into account the 'justifiable' reasons why sequences of household moves come to an end, and if we exclude the 'unjustifiable' reasons (all the cases where no contact could be made because the household comes

Table 3

Reasons for the ending of the chains of moves

Distribution of reasons	Tunis	Chihuahua	Mexico City	All	%
Newly formed household	37	4	72	113	45.8
Recent migrants	12	15	18	45	18.2
Dwellings removed	19	6	27	52	21.0
No contact could be made	25	3		28	11.0
Dwellings temporarily vacant	7	2		9	3.7
Total	100	30	117	247	100.0

from a squatter area or from an 'oukala'[1] without a precise address), we find the same reasons in the same order for Mexico City and for Tunis. In both cities, the first reason is that the present dwelling is occupied by a newly-formed household (Tunis, 49.3 per cent of the justifiable cases, Mexico City 61.6 per cent). The second reason is that the previous dwelling has been removed from the housing stock (Tunis 25.3 per cent, Mexico City 23 per cent). The third reason is that the present dwelling is occupied by a recent migrant (Tunis 16 per cent, Mexico City 15.4 per cent).

But for Chihuahua we do not have the same order of reasons. In Chihuahua, the first reason why the sequences of moves end is that the present dwelling is occupied by a recent migrant: this is the case of 55.6 per cent of the justifiable reasons. The second reason is that the dwelling was removed (22.2 per cent) and the third reason is that the dwelling is occupied by a new household (14.8 per cent).

How could we explain this difference between Tunis and Mexico City on the one hand and Chihuahua on the other hand? We can say that the way chains end depends on the size of the study area, on the population level, and on the rate of income and population growth. Thus, in relatively large cities (Mexico City and Tunis) where population is important, where housing conditions are relatively bad, where dwellings are overcrowded, and where population grows fast, chains end mainly in newly-married households from about the same income level.

In Chihuahua, a city of only 300,000 inhabitants, where housing conditions are better than in Mexico City or in Tunis, where economic opportunities attract families from other parts of the state, and where recent migrants belong to all income groups, it is not surprising that these migrants constitute the most important reason for the ending of sequences. Of course, Mexico City and Tunis also have a high rate of migration, but the effects of this migration on the sequences of moves ends are less important than the effects of the existing households or newly-formed households who are not well housed and who do not miss any opportunity to move into a vacant dwelling in order to improve their housing conditions.

Lastly, we notice that in Tunis, the number of ends with unjustifiable reasons (households coming from a squatter area without a precise address) is relatively high (25 per cent of cases). This may be explained by the fact that the Tunisian survey was mainly concerned with low and average value housing as compared with the Mexican surveys. Therefore, filtering down in Tunis reached households in squatter areas in a shorter number of sequences.

Length of the Sequences of Moves and Value of New Dwellings

We are now concerned with the relation between the price of a new dwelling at position one and the length of the sequence, in order to know whether the sequences starting with expensive dwellings are longer than those starting with moderately priced ones.

As shown in Table 4, inexpensive new dwellings initiate short sequences, while relatively expensive ones initiate longer sequences. In the case of Tunis, the length of sequences rises (from 1.17 to 2.06) as the dwellings become more expensive. Following Watson (op. cit.), we can explain this result by the fact that lower value initiated chains are considerably more likely to end by reason of demolition of a previous unit. And without the public slum clearance and other demolition programs, chains initiated at lower value new homes would also be longer than observed (Lansing and Morgan, op. cit., and Watson, 1974). However, all new dwellings in Tunis with values above $6,000 seem to initiate sequences of approximately the same length. In the cases of Chihuahua and Mexico City the length of sequences rises as the dwellings become more expensive, reaches a maximum value (respectively at 2.67 and 2.52) and then decreases.

If we take into consideration the fact that the Tunisian survey was mainly concerned with low and average value housing (83 per cent of the dwellings less than 10,000 dollars-value) and that the Mexican surveys reached higher valued dwellings, we may conclude that there is no contradiction between the Tunisian and the Mexican findings. Therefore, the general conclusion could be that, contrary to surveys carried out in the United States, the longest sequence is not initiated by the most expensive dwellings. Dwellings in the middle-value

[1] A large traditional house in the old town of Tunis, where rooms are occupied by different families having in common the central area of the dwelling (patio or inner court), the bathroom and sometimes the kitchen.

Table 4

Length of sequences and value of new dwellings in Tunis, Chihuahua and Mexico City

Value of new dwellings in $U.S.	Tunis (1974)			Chihuahua (1975)			Mexico City (1976)
	NND	NM	LC	NND	NM	LC	LC
Less than 3,000	12	14	1.17				
3,001–6,000	46	82	1.75				
6,001–8,000 }	25	51	2.04	7	13	1.86	2.15
8,001–10,000 }				11	22	2.00	2.52
10,001–14,000 }	17	35	2.06	6	16	2.67	
14,001–20,000 }				3	7	2.33	
more than 20,000				3	6	2.00	2.47
Total	100	182	1.82	30	64	2.13	

NND = Number of new dwellings
NM = Number of moves
LC   = Length of chains (LC–NM/NND)
For Mexico City, only complete chains are considered.

range ($8,000–$14,000) produce the longest sequences. This conclusion has been confirmed by the results of our model in which the objective function was to maximise filtering, taking into account a certain number of constraints (Ferchiou, 1974). According to this model, in a less developed country, such as Tunisia, where a high percentage of households are homeless and where investment in housing is a limiting constraint, a filtering strategy based on high quality dwellings is not adequate and will not benefit the lowest income groups. A filtering strategy based on the construction of average quality dwellings constitutes a better but not necessarily optimal long-run housing policy.

Characteristics of the Dwellings at Different Sequences

If filtering down is taking place, the successive housing units involved in the sequence of moves ought to be characterised by successively lower values on the average and by lower quality dwellings.

The Rent of Successive Dwellings in the Sequences of Moves

Downward filtering is likely to occur if the rent of the initial dwelling is higher than the rent paid for the last dwelling in the sequence.

Table 5

Rent paid in the first and last dwelling in the sequences of moves in Tunis and in Chihuahua (in $US)

Number of moves	Tunis (1974)			Chihuahua (1975)		
	ARFD 1	ARLD 2	% Decrease between 1 and 2	ARFD 1	ARLD 2	% Decrease between 1 and 2
2	66.80	33.20	50.3	74.40	44.40	40.3
3	74.60	48.00	35.6	80.00	44.40	45.0
4	70.00	29.60	57.7	108.00	43.20	60.0
Averages	68.60	36.00	47.5	87.40	43.80	49.9

ARFD = Average rent of the first dwelling.
ARLD = Average rent of the last dwelling.

Average rent refers either to rent paid or to monthly payment.

Filtering down is taking place since the successive housing units in the sequences of moves are indeed characterised by successively lower values. The average reduction in rent is 47.5 per cent for Tunis and 49.9 per cent for Chihuahua. However, for both Tunis and Chihuahua, the overall average rent in the last position (36 dollars in Tunis and 43.80 dollars in Chihuahua) is excessive for low income groups. We may, therefore, conclude that although filtering down exists and is actually taking place, it only influences middle-income group households; it does not reach very low income groups since they could not pay such a rent. This conclusion will be tested when the income of successive households is analysed.

Physical Characteristics of Successive Dwellings

If we assume that the number of rooms and the availability of utilities indicate the quality of the dwellings, we may conclude that downward filtering is taking place if the quality of the dwellings decreases as sequences become longer.

Table 6

Average number of rooms per dwelling at different positions in Tunis, Chihuahua and Mexico City

Positions	Tunis	Chihuahua	Mexico City
Position 1	3.18	5.57	5.05
Position 2	2.70	4.55	3.71
Position 3	2.30	4.60	3.44
Position 4 and above	2.00	2.75	3.14

Successive housing units are smaller in size since the average number of rooms per dwelling declines along the chain of moves. However, the average size of dwellings in the last position (2 for Tunis, 2.75 for Chihuahua, and 3.14 for Mexico City) is larger than the size of the dwellings usually occupied by the lowest income households (one or two rooms). For example, in the district of Tunis, 17.5 per cent of the households were living in one-room dwellings in 1975. This seems to confirm our preceding conclusion that the filtering phenomenon does not reach the lowest income groups.

As expected, successive dwellings have lower housing installations which means that filtering down is taking place. In Tunis the availability of housing facilities decreases faster than in Chihuahua.

Table 7

Percentage of dwellings with all facilities in Tunis and in Chihuahua

Positions	Tunis	Chihuahua
Position 1	95	100
Position 2	42.5	80
Position 3	23.5	80
Position 4 and above	0	63

By 'all facilities' we mean electricity, running water, a toilet and a bathroom.

The Location Within the Studied City Area of Successive Dwellings

Our objective is to see whether dwellings at different positions in the sequences of moves differ systematically in their locations within the city studied. Does a policy of encouraging new construction in suburban areas have an indirect impact upon crowded conditions in the center of the city? Is there a tendency for the sequences to develop inward towards the center of the city as they become longer?

Table 8

Mean distances from the center of the city at different positions (in kilometers) for Tunis and Mexico City

Positions	Tunis	Mexico City
Position 1	7.46	12
Position 2	6.51	—
Position 3	2.23	—
Position 4 and above	0.25	6.7

There is indeed a tendency for the sequences to develop inward towards the center in both Tunis and Mexico City. In Tunis, the Medina (old town) which is the center of the city is playing an important role as a transitional area, mainly in the case of migrant households.

The Incomes of Households at Different Positions

If filtering down is taking place, the average income of the households at each position is expected to decrease.

The successive households involved in the sequences of moves which begin with the construction of new dwellings are indeed characterised by successively lower incomes, which proves that filtering

Table 9

The household incomes at different positions (average incomes per month)

Positions	Tunis (1974)		Chihuahua (1975)		Mexico City (1976)	
	$US	Index	$US	Index	$US	Index
Position 1	142	100.00	456	100.00	556	100.00
Position 2	136	95.80	282	61.80	455	81.80
Position 3	114	80.30	212	46.50	411	73.90
Position 4	96	67.60	208	45.60	370	66.50
Position 5 and above	—	—	—	—	336	60.40

down is taking place. However, in the three cases, housing shortages in the middle of the income scale prevented the chains from reaching the lowest income strata.

In the district of Tunis, the average monthly income at the lowest position is $96, which means that more than 30 per cent of the households of the district (more than 50 per cent on the national level) having lower incomes are not touched by the indirect effects of the new dwellings construction. In Chihuahua, the lowest level of income reached by filtering trends ($208) is above the income earned by approximately 50 per cent of the families in the city area. Finally, in Mexico City, where 37 per cent of the families had incomes equal or lower than $228 in 1976, we notice that the average monthly income at the lowest position reached $336 and was therefore much higher.

However, C. W. Prentice (1976, op. cit.) noticed that of all families affected directly and indirectly through chains of moves by new public construction, between 15 and 35 per cent had incomes lower than $228; while with chains of moves started by private new constructions the percentage was only 2.8. Since the private construction sector is mainly concerned with high value new houses, it is possible to confirm our previous conclusion that high value new houses generally have lower chain lengths and consequently less opportunity to reach poor families. This conclusion confirms the results of some housing experts such as Brueggeman (1973) and Watson (1974) who say that chains begun by lower value new homes have a greater penetration to lower income groups.

One of the reasons which prevented the chains reaching the lowest income strata was the existence in the middle income scale of upward filtering trends. As a matter of fact, in Tunis, 35 per cent of the dwellings were occupied by families who had

higher incomes than the previous one. In Chihuahua, these upward filtering trends involved 26.5 per cent of the household moves. In Mexico City, 30 per cent of the families at the last positions had higher incomes than those of the first position (occupying new houses).

Reasons for Household Moves

In order to understand in what way households benefit indirectly from the construction of new dwellings we must know the reasons for their moves. It is generally assumed that when people move from one dwelling to another they improve their housing conditions.

Table 10

Reasons for household moves in Tunis and in Chihuahua (in percentages)

Reasons for moves	Tunis	Chihuahua
Access to ownership	44	40.4
Better neighborhood	8.8	10.9
More space needed	—	22.9
Nearness to the center	11	—
Access to place of employment	—	16.5
No other opportunity	21.4	—
Former dwelling demolished	6.6	—
Other reasons	8.2	9.3
Total	100.00	100.0

For both Tunis and Chihuahua, the first reason why people move is the desire to become home-owners. For most families in developing countries, housing ownership is the preferred form of invest-ment.

Let us note that in Tunis and in Chihuahua homeowners in position one (new dwellings) represent respectively 92 and 76.7 per cent of the

total number of households. For old dwellings (positions 2, 3 and 4), homeowners represent respectively 25 per cent of the total number of households in Tunis and less than 40 per cent in Chihuahua. This means that new dwellings (public or private) are mainly built for sale and not for renting, since the desire for home ownership is very high; but it also means that in both Tunis and Chihuahua, mortgages for old houses are either nonexistent or hard to obtain, which explains the high percentage of tenants of old dwellings despite the high desire for ownership.

While the desire to live in a more spacious home constituted the second reason for moving in Chihuahua, it is not considered as an important one by Tunisian households. On the other hand, nearness to the center constitutes the second reason for moving in Tunis but not in Chihuahua. This may be explained by the fact that in the case of Chihuahua the dwellings surveyed were located near employment centers.

The desire to move to better neighborhoods is not a relatively important reason for moving in either Tunis or Chihuahua.

Finally, 21.4 per cent of the Tunisian households said that they moved into their dwellings because they were obliged to move, and because they could not find better dwellings. These households moved for various reasons (recent migrants, new households, unable to stay any longer in their former dwellings, etc.). They would have preferred better houses than the ones they were occupying during the survey. For these households there is no certainty that they improved their housing conditions and there is a high probability that they will move again as soon as they have better opportunities.

Summary and Conclusion

The purpose of this article was to trace the indirect consequences of new construction and to compare empirical measures of turnover vacancies in Tunis, Chihuahua and Mexico City.

The average length of the chains of moves was 2.09 (1.82 in Tunis, 2.13 in Chihuahua, and 2.31 in Mexico City) which means that for each dwelling built, there were two households who improved their housing conditions. The length of the chains of moves depended on the value of the initial dwellings. Chains begun with low value new construction are

shorter than those begun with middle or high value new construction. However, dwellings in the middle value range initiated the longest chains of moves (Mexico City and Chihuahua). This, of course, would contradict the regularly held conclusion, based on US surveys, that chains begun in higher value new construction have longer overall chain length. The chains of moves ended either because the new home occupants left no previous dwelling units behind (newly formed households or recent migrants) or because the dwelling was removed, mainly in the case of chains begun with very low value new dwelling.

Downward filtering is taking place, since the successive housing units in the sequences of moves were indeed characterised by successively lower values, successively smaller sizes and successively lower housing installations. This important conclusion is also supported by the fact that households involved in the sequences of moves were characterised by successively lower incomes. However, housing shortages in the middle of the income scale prevented the chains from reaching the lowest income strata. Finally, the desire to become a homeowner constitutes the main reason for household moves.

On the basis of the above findings it is doubtful that in less developed countries, where housing conditions are generally poor, where the percentage of homeless households is high and where investment in housing is still limited, a filtering strategy could constitute a good long-run housing policy if a certain number of conditions are not fulfilled.

Thus, filtering strategy should be based on the construction of middle value new dwellings since they begin the longest chains of moves. Nevertheless, the lowest income groups do not improve their housing conditions through this filtering strategy since housing shortages in the middle of the income scale prevented the chains from reaching them. These lowest income groups are also excluded from the formal market of new home ownership. They could either rent substandard dwellings in squatter areas or build homes on a do-it-yourself incremental basis. The only way left for the housing authorities to help them is with slum upgrading, with providing utility serviced sites and with semi-finished, expandable core housing (Strassmann, 1977, 1980).

Therefore, a filtering strategy and slum-upgrading

program are complementary housing policies; and together they reach both middle-income and low-income groups. Lastly, since the desire to become a home owner is high in less developed countries and since home ownership is the first condition for housing upgrading programmes (adding more rooms, or improving housing installations) and since through the filtering strategy people could improve their housing conditions by either moving to new or old dwellings, competitive credit terms and mortgages should be readily available to all households for new or old dwellings.

In many developing countries, while the number of new dwellings added every year to the housing stock is increasing, the total housing services provided by the whole stock is not increasing at the same rate because of the continuous physical deterioration of the existing stock of dwellings. Therefore, a filtering strategy, supposing that a certain number of households will improve their housing conditions by moving into new dwellings while other households move into old dwellings, will be limited if it is not supported by a housing policy giving as much importance to upgrading programmes as to new construction programmes. One can conclude that housing upgrading is one condition for a filtering strategy success.

Our conclusions, based on the findings of only three surveys in three different cities, are of course not automatically valid for all Third World cities; however, without ignoring the urgent necessity of having further surveys in other developing countries, the conclusions of this article may give us a broad idea on how filtering in a less developed country may work.

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