Behaviors on Intra-urban Residential Mobility: A Review and Implications to the Future Research

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After reviewing more than 200 research papers published between 1955 and 2009 in the areas related to intra-urban residential mobility, we have identified three aspects involved in a household’s intra-urban residential mobility decision making process: mobility motivations, mobility constraints and mobility psychology underpinned by theories under either the assumptions of rationality or irrationality. It is concluded that mobility decision making process is better explained by the combined approaches from urban economics, financial economics and behavioral economics. It is highlighted in the paper that the consideration of psychological factors in explaining mobility behavior may change our previous understanding on a household’s intra-urban mobility decision making process. The review offers some ideas for further research.

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1. Making the connections

Since the often cited work of Rossi (1955), research on intra-urban household mobility decision making process has never stopped attracting researchers’ attention from different disciplines. Sociologists, ecologists, economists and psychologists have all attempted to study the behaviors of intra-urban residential mobility. Even within the same discipline, there are different groups or networks of researchers specializing in the different aspects of a household’s mobility decision. For example, some economists assume that households freely juggle the relevant amounts and locations in four different housing markets, for jobs, for housing, for transport and for other goods to achieve an optimum. However, others model households’ mobility decision under the assumption that residential decision-makers are overall sub-optimizers in that they can normally operate in a single market at a time. In a field so large and covering many sub-fields, researchers could easily lose track among the numerous approaches and would be difficult to judge the value of each other’s work and place it in perspective (Mulder, 1996).

Four reasons have made intra-urban mobility study an inexhaustible source of research topics over 4 decades. First, the outcomes of intra-urban mobility decision are critical to understand changes in the spatial character or regions and of metropolitan areas. Mobility is the proximate cause of changes in the composition and character of a neighborhood. Redistribution of population reflects changes in the pattern of housing demand and in the network of transportation flows within a city (Quigley and Weinberg, 1977). Second, mobility study can aid us to understand the changing demand for mortgage market. Tenure choice or turnovers among homeowners are the proximate causes of mortgage demand or termination. Mortgage credit cost and availability also reinforce mobility process. Hence, mobility links housing market performance to general economy performance through mortgage market. Third, mobility decision making process is linked to a household’s investment decision making process as buying a house serves both consumption and investment purposes. Mobility in response to the rise and fall of housing price is an important explanatory factor of consumption. It can reinforce general economic performance through wealth effect. Finally, the study of psychological factors driven mobility may aid us to comprehend speculation behaviors and hence prevent housing bubbles from happening.

This review illustrates a timeline of intra-urban mobility research focus shifts. The earlier theoretical literature underpinning the mobility process rooted in the sociology and geography disciplines, pioneered by Rossi (1955, 1980) and Brown and Moore (1970), focused on the dissatisfaction of the original location triggered by life cycle changes. Economists (Fredland, 1974; Brown, 1975; Hanushek and Quigley, 1979) attempted to model the decision making process using neo-classical, micro-economic sense of utility maximization or random utility function based on housing consumption disequilibrium approach or housing consumption mismatch resulted from an unanticipated economic or demographic shock.
The work of Henderson and Ioannides (1983) and Ioannides and Rosenthal (1994) advocated a series of studies about the wealth effect or investment aspect of owning a dwelling, such as a tenure shift caused by the demand for a homeownership or a move triggered by rising housing price to finance consumption (Kiel, 1994; Nakagami and Pereira, 1991; Quigley and Shiller, 2005).

Stein (1995) and Genesove and Mayer (1997) pioneered the study on how mortgage constraints might play an important role in a seller’s decision to sell, while loss aversion (Genesove and Mayer, 2001) and risk aversion approaches (Kan, 2002, 2003) broke new ground to study how psychology factors might affect a mobility decision.

This paper argues that, the focus shifts of mobility research since Rossi (1955) have indicated both the importance of the issue as well as the necessity to reconcile the different approaches into a unified view of mobility decision process and the consideration of psychology factors may change our previous understanding on mobility behaviors, stimulating further research avenues from the viewpoints of both urban economics, financial economics and behavioral economics.

A few studies have attempted to differentiate intra-urban mobility from inter-urban mobility. Inter-urban mobility is a long-distance move driven primarily by job-related or “human capital” reasons (Greenwood, 1985; Zax, 1994), while intra-urban mobility is a short-distance move driven by a variety of non-job/non-human capital related reasons (Rossi, 1955) as housing is a complex good and the choice of a housing location is determined by a combination of a household’s different social economic activities, not just a distance to their job location. Hence, these movers may place more weight upon non-economic factors than do movers who move to other cities (Eaglstein and Weisberg, 1990). Secondly, residence and workplace relocations appear to be complementary among inter-urban migrants, however, they appear to be substitutable among intra-urban movers (e.g., Bartel, 1979; Linneman and Graves, 1983). Finally, there is an interdependent relationship between intra-urban mobility and migration decisions themselves (Boehm et al., 1991; van Ommeren et al., 1999). In this respect, anticipated migration in the near term should diminish the likelihood of an intra-urban move due to the truncation of benefit streams associated with such housing realignment, ceteris paribus. Alternatively, if a household moves within a given urban area in order to improve its housing situation, it is less likely that this family will decide to migrate and lose such benefits.

The following review will focus on the residential mobility decision making process within an urban area, rather than on the effects of mobility, since an understanding of this process is an important prerequisite for an understanding of the effects of mobility. Meanwhile, this paper extends the intra-urban residential mobility literature review done by Quigley and Weinberg (1977), Mulder (1996) and Dieleman (2001).
The next section attempts to offer a critique review of mobility approaches from theoretical perspective. This is flowed by a summary of main empirical findings. A unified approach is proposed in Section 4, followed by a concluding section.

2. Theoretical approaches

2.1 Mobility motivations

Sociologists’ life cycle approach. Originated from sociology research, mobility study in the early stage assumed each social group to have a constant propensity to move, which was related to its threshold of place utility (the degree of attractiveness of an area where people were living in relative to alternative locations) (Wolpert, 1965; Brown et al., 1970; Yapa et al., 1971). The place utility threshold approach was further developed into a strain-stress model in which an individual would migrate as a form of adaptation to stress exerted by his environment (Wolpert, 1966; Speare, 1974). However, stress should not be the only predictor of mobility (Lee, 1978; Newman and Duncan, 1979; Landale and Guest, 1985). Social ties and economic opportunity also have an effect on mobility decision (Toney, 1976; Clark and Huff, 1977; Huff and Clark, 1978). Thus, intra-urban mobility has been regarded as a process of adjustment whereby one residence site is substituted for another in order to better satisfy the changing demand of a household (Brown and Longbrake, 1970). The life cycle approach proposed by Rossi (1955) has been widely adopted by the researchers from different disciplines to identify the changing demand until now.

Economists’ housing consumption approach. The economic motivations of mobility have been well studied by economists since the late of 1960s. A household’s decision to move is typically placed in a partial equilibrium framework resulted from the disequilibrium in housing consumption1 (Quigley and Weinberg, 1977; Boehm and Ihlanfeldt, 1986).

Hanushek and Quigley (1978) are among the first who attempt to model the relationships between mobility and housing consumption disequilibrium. In their model, moving decision is modeled as a function of housing demand, transaction and search costs, and the distribution of housing prices. Their findings indicate the importance of changing housing demand in affecting moving decision and searching intensity. Graves and Linneman (1979) develop a consumption model of residential choice, in which housing market disequilibrium-induced migration is modeled as a function of changes in the variables determining the demands and supplies of the non-traded goods which are location specific. The empirical tests of hypotheses stemming from this model indicate that the probability of the residential relocation is positively related to changes in the absolute value of those exogenous variables which lead to altered demands for non-traded goods. Shear (1983) extends this analysis by considering how rehabilitation affects the supply of second period housing services for a housing unit2. It is concluded that non-movers value their housing services differently in their rehabilitation decisions from the movers. Therefore, it appears unlikely that the moving decisions by homeowners can be adequately explained without relating it to their

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rehabilitation decisions.

**Investment and wealth effect approach.** It is widely recognized in the housing literature that housing choices involve both consumption and investment motives\(^3\) (e.g., Ranney, 1981; Henderson and Ioannides, 1983; Case and Shiller, 1988). Due to lack of institutional arrangement that would allow a household to own part of its home, the housing investment of homeowners must be at least as great as their housing consumption. Fu (1995) illustrates the conflicts between the consumption and investment motives due to the inability of the household to liquidate the future gains of investment for current benefits\(^4\). For an illiquid household, his analysis show that the effects on housing choices of permanent income, as well as those of expected housing price appreciation and uncertainty as to the future housing price, depend on the relative magnitude of the income effect and substitution effect of future wealth, which, in turn, depend on the behavior of future risk aversion and the rate of intertemporal utility of substitution\(^5\). However, a decrease in certainty-equivalent income also increases risk aversion, leading to less investment and increased current consumption. Thus, no theoretical conclusion can be drawn about the relationship between income uncertainty and housing investment\(^6\).

The work of Henderson and Ioannides (1983) and Ioannides and Rosenthal (1994) advocate two streams of studies on the wealth effect of housing. One stream of literature focused on explaining the tenure shift related mobility behaviors (Pickvance, 1974; Boehm, 1981; Pickles and Davies, 1985; Henderson and Ioannides, 1987, 1989). Tenure choice and mobility decision have been usually treated as a simultaneous decision making process in recent studies (Krumm, 1984; Zorn, 1988; Ioannides and Kan, 1996). The most consistently presented relationship is that the effort of moving is far greater for one who owns a dwelling than for one who rents it, *ceteris paribus*, because the legal maneuvers involved in the transfer of ownership as well as the psychological implications of possession may act as a resistance to movement. Meanwhile, dependence between the mobility decision and either tenure status before or after the period in which migration could take place has been frequently supported. These findings suggest that housing demand studies must consider households’ joint mobility-tenure decisions to obtain accurate estimates of the demand for housing.

From housing investment viewpoint, rising housing price may trigger an earlier move to finance consumption (Kiel, 1994; Nakagami and Pereira, 1991; Case *et al.*, 2005). Economic theory suggests that house prices may affect the behavior of household in many ways. The main effect is through the downpayment requirement. Under suitable equilibrium conditions, inflation raises initial mortgage payments through higher interest rates, causes such payments to fall rapidly over time in real terms, and creates a real growth in housing equity via leveraging against the inflating given house size the downpayment requirement causes a greater amount of saving to be done as a renter. Kearl (1979) argues that inflation does increase the household’s real burden of debt service
even if anticipated correctly and therefore increase the real cost of housing capital, leading to a fall in the demand for housing and a reduction in the relative price of housing, \textit{ceteris paribus}. Unfortunately, his attempts do not examine the underlying microeconomic foundations of his results. To bridge the gap, Schwab (1982) provides a two-period theoretical model for investigating the relationship between inflation and the demand for housing, focusing on the interaction of inflation expectations, imperfect capital markets, and the mortgage instruments. The results show that even if inflation is fully anticipated, the interaction of inflation, the standard mortgage, and imperfect capital market is also likely to distort the household’s demand of housing. Wheaton (1985) extends Schwab’s (1982) model into a continuous life-cycle model, and examines the effects exerted by liquidity constraints and borrowing constraints on the demand for housing. The results suggest that housing demand is reduced by higher economy-wide inflation only under a very particular set of circumstances, in which borrowing constraints are binding and real interest rates are less than consumer discount rates.

In order to partially offset the disutility of the increased saving, a household delays its purchase time and also adjusts its amount of both housing and non-housing consumption, as well as decreasing the amount of housing bought as an owner. Gillingham and Hagemann (1983) demonstrates that variation across cities in expected housing price appreciation does have a statistically significant impact on the type of house owned and, therefore, the quantity of housing services demand. Also, these findings confirm the results of Yoshikawa and Ohtake (1989), who find that in an increase in land prices in Japan increases the saving rate for those renter households with plan to purchase a home. This frequently used hypothesis has also been empirically tested by Henderson and Ioannides (1987). Based on the examination on different strata of the PSID sample according to the likely of facing capital market constraints, they find that inflation rate reduces housing expenditures for owners. However, for renters the impact is the opposite, which may reflect attempts by renters to lock themselves into long-term nominal rental contracts in the face of inflation.

Nakagami and Pereira (1991) present a theoretical model of intra-metropolitan residential mobility for homeowners by incorporating both the consumption and the investment aspects of homeownership. They find that appreciation leads to faster trade-up and hence increased mobility, and that rising interest rates reduces the incentive to trade-up and therefore lower mobility. For the changes of welfare, housing appreciation makes current homeowners better off in terms of welfare. However, unlike current homeowners, first-time home buyers suffer from housing appreciation. The decline in regional house prices and the general fall in interest rates in the early 1990s have provided researchers with a new environment in which to analyze mobility issues and a new set of questions to answer. Using Canadian data, Engelhardt (1994) finds strong evidence that the higher the house price, the less likely the household is to save for a downpayment. The empirical results suggest that roughly 5% increase in house prices decrease the probability of saving for a
downpayment by one percentage point.

The direction of the affect of previous appreciation on mobility seems unclear. For example, in contrast to many findings, Boehm (1981) provides some evidences that the higher the expected rate of inflation of housing, the more likely anyone anticipating a purchase would be to buy at any given time. Alm and Follain (1982), by use of a simulation, assess the effect of mortgage choice in an inflationary and liquidity-constrained environment on the timing and quantity of individual housing decisions. They find that inflation below 10% increases housing demand, while greater inflation decreases it. Although it appears that the estimates are very sensitive to model specification, the opposite results may also due to inappropriate assumptions required for estimation (Bartik et al., 1992; Kiel, 1994).

### 2.2 Mobility constraints

**Mortgage costs and availability constraints.** Analysts of housing policy have long recognized that access to mortgage funds may affect the moving decision. Mortgage market is important precisely because mortgage allows the household to tap his capital value of future income in its allocational decision and therefore allows the household to more closely adjust its asset portfolio as desired. In reality, higher housing leverage serves as a signal for higher risk when exact evaluation of the probability of default is impossible. Consequently, the higher is the mortgage relative to a house’s value, the higher is the interest rate charged to the household. It suggests that a household can control over the price of credit it receives by changing the levels of leverage. An extensive examination of mortgage financing and its relationship to housing demand and tenure decisions has been conducted by Plaut (1984, 1985, 1986, 1987). He presents his basic model in Plaut (1984), with extension in Plaut (1987). He examines the impact of endogenous interest on life-cycle consumption behavior and tenure choice in a deterministic world where the household’s life-cycle income and tastes are known. He theoretically proves that a household will tend to consume less during their early years in order to boost the size of the down payment that is made when housing is purchased later. Plaut (1985) uses the same model to show that an increase in the leverage sensitivity of the mortgage interest rate leads to flatter housing gradients and greater suburbanization. Under this circumstance, a mortgage’s schedule amortization can also influence housing demand (Plaut, 1986).

Linneman and Wachter (1989) utilize micro-data to directly qualify the impact of mortgage underwriting criteria on individual homeownership propensities. Their empirical results indicate that the presence of both income and wealth constraints reduce homeownership propensities, with a stronger impact for wealth constraints. It suggests that if a family cannot afford the minimum required downpayment on a home it deems worth owning, then its most viable alternative is to rent until it can afford a sufficient downpayment.
In response to the 1980’s relatively high fixed-rate mortgages, adjustable rate mortgages (ARM) become popular. Brueckner and Follain (1988) examine the rise in the ARMs’ popularity and find that households with high incomes and a greater degree of inter-metropolitan mobility also prefer ARMs. As shown in Brueckner and Follain (1989), at a typical interest rate, a given individual demands more housing as an ARM borrower. Goodman and Wassmer (1992) develop the concept of an optimal mortgage by using a dynamic model in which transaction costs constrain mobility. The model provides a useful insight into why the development of an optimal payment schedule could stimulate mobility. It is interesting to find that payment flexibility within a given stay, even without the ability to borrow, can yield comparable utility to the borrowing with fixed payment instruments. While it is widely accepted that the equilibrium menu of mortgage contracts exhibits a trade-off between mortgage points and interest-rates (see Chari and Jagannathan, 1989 for example), there have been few attempts to explain why this menu emerges in the first place. Brueckner (1994) models the borrower as choosing a two-period mortgage with fixed payments that may differ across time. It has been shown that borrowers select contracts from this menu in fashion according to mobility. Specifically, the high-mobility borrower’s choice of the low-initial-payment/high-final-payment contract corresponds to a low-points/high-rate choice, and vice versa for the low-mobility borrower. It is safe to say that all the arguments outlined above imply that an owners’ equity position determines his experience as a seller.

Liquidity constraints. As discussed above, the purchase of a house typically requires a significant downpayment. An important implication is that the demand for housing will be affected by households’ liquidity. Artle and Varayia (1978) and Jackman and Sutton (1982) are among the first to theoretically demonstrate conditions under which renters but not owners will typically be liquidity constrained. Their arguments suggest that liquidity constraints give rise to a high propensity spend out of current income. As housing prices fall, some potential movers find their liquidity so impaired that they are better off staying in their old house rather than attempting to move. Some empirical analyses strongly suggest that differing financial terms are not fully capitalized into housing value, and many mortgages are not legally assumable (Quigley, 1987). Under such circumstances, lock-in effect of the ownership of mortgage may arise. Although the size of the effect has been shown by Zorn (1989) to be small, a decrease in the relative cost of owning is found to increase the impact of mortgage qualification criteria in constraining homeownership. It suggests that the policies designed to limit the impact of binding mortgage qualification requirements will be more successful in economic environments favorable to homeownership.

Downpayment and other borrowing constraints can also add a self-reinforcing mechanism to demand shocks. A few papers provide micro-analytic insights into what constitutes the fundamental essence of the time-variant liquidity characterizing the transaction process in real estate. Haurin (1988) is a noteworthy example. He applies the standard search model to sellers
and argues that the higher the variance of the distribution of offers for a house, the longer the expected wait for an acceptable offer. Stein (1995) constructs a static model that illustrates how the effects of downpayment constraints on repeat buyers can reduce mobility. In his paper, the opportunity cost of trying “fishing” is zero for families who would otherwise be non-movers. If these families do not fish, it is certain that they will stay in their old homes. However, if these families get lucky and sell their houses for an above-market price, they may be out of liquidity constraints to make moving worthwhile. Being closer to that of Stein (1995) in its focus on downpayment constraints but differs in terms of model design and predictions, Ortalo-Magné and Rady (2006) propose a life-cycle model of the housing market with a property ladder and a credit constraint. His model helps us identify a channel whereby changes in income may cause prices to overshoot and to display a positive correlation with housing transactions. This channel relies on the capital losses or gains on “starter” homes incurred by credit-constrained owners.

Glower et al. (1998) highlight the importance of seller heterogeneity in the search process for housing. Their finding based on a telephone survey indicates that home sellers who are motivated to sell quickly will set a lower list price, have a lower reservation price and accept earlier. Empirically, Genesove and Mayer (1997) use a sample of condominiums listed for sale in Boston to test this hypothesis. Their results show that a household with more debt has a lower probability of selling its home, even conditional on listing the home with a broker. It suggests that a reduced willingness to sell in a down market may be a rational response by all sellers to positive expected future returns in the housing market.

In addition, in face of liquidity constraints, household mobility is significantly influenced by nominal loss aversion. Genesove and Mayer (2001) are among the first to examine nominal loss aversion in the housing market. The basic hypothesis is that homeowners treat gains and losses different, and are reluctant to realize nominal losses. In this context, they, using the data from the downtown Boston condominium market, prove that most of seller behavior seemed to be driven by nominal loss aversion. Engelhardt (2003) exploits the recent variation in U.S. house prices to examine the effect of equity constraints and nominal loss aversion on household mobility. As a concomitant to Genesove and Mayer’s analyses in 2001, he has also reaffirmed that a household’s moving decision is significantly influenced by its nominal loss aversion. Little evidence that low equity because of fallen house prices constrains mobility has been provided in his paper.

**Transaction costs (out-of-pocket costs of moving, searching costs, legal fee etc).** One of the distinguished features of housing consumption is the substantial transaction cost associated with changing the set of housing services consumed. Typically, the act of removing the cost constraint may have restricted the adjustments of housing needs. The existence of moving costs suggests that significant lags in adjustment are likely and that disequilibrium in housing consumption may be quite pervasive. In general, moving cost can be broken down into money and non-money costs.
to each type of tenure (Sjaastad, 1962). The former include the out-of-pocket expenses of movement, while the latter include opportunity costs and the psychic costs of changing one’s environment. Firstly, a change in residential location always involves in a substantial investment in search for information on available dwellings, realtor’s fees, mortgage closing costs, physically transporting one’s possessions and making other purchases nearby, including the schooling of one’s children (Hanushek and Quigley, 1978; Venti and Wise, 1984). The mobility effects of mortgage lock-in have been analyzed by Quigley (1987) and Harmon and Potepan (1988). For renters, as shown by Kain and Quigley (1975) and Shelton (1968), moving costs also include the rent discounts attributable to long-term occupancy in any particular dwelling unit which are foregone by moving. Secondly, variation in the costs of obtaining information, in the housing market institutions and in the degree of segmentation in the housing market provide an additional reason why observed mobility rates for otherwise comparable households may differ across cities (Haurin, 1988; Stein, 1995; Krainer, 2001). More efforts for searching will not yield a “better” match, but rather the more rapid attachment of a known improvement in housing quality (Wheaton 1990). Also, there is a risk of bearing the cost of simultaneously owning two houses in two localities or delaying the purchase of a new house while attempting to sell the current house. Finally, psychic costs involve the actual discomforts of moving, the loss of social bonds at the present residence, and the possible agony of settling in a new destination. While difficult to quantify in monetary term, these costs are undoubtedly important. Attachment costs tend to strengthen over time, producing duration of stay effects (Land, 1969; Speare, 1970; Dynarski, 1985). Such effects may attribute the lower frequency of moves among older households as one gets older and grows more attached to a neighborhood (Kaluzny, 1975; Alperovich, 1982).

As far as we know, no clear empirical estimates of the level of generalized moving costs are available, but the residential moving costs are very likely high. Some studies estimate moving costs by calculate how much the household is willing to pay to stay at its current dwelling if no observed variables change. Dunn (1979), Venti and Wise (1984), Bartik et al. (1992) and many others all estimated moving costs of between 10 and 20% of income. In a careful study, Rosenthal (1988) assumes that transaction costs are 7% of house value, but notes that this value must be discounted to the present to compute the user cost at the time of house purchase. However, psychic costs have encountered empirical difficulties. As Schwartz (1973) state, psychic costs can be converted into permanent transportation costs by figuring the needed frequency of visits to the place of origin so as to negate the agony of departure from relatives and friends. He goes on to argue that psychic costs are likely to rise with age and hence the deterring effects of distance should also rise with age. Obviously, greater attention to psychological moving costs may improve both the positive and normative content of intra-urban mobility analysis.

**Housing supply constraints.** Prevailing condition in housing and land market may also be important, and state and local taxes and the associated availability of public goods may be critical
to certain potential movers.

Firstly, housing market tightness affects the mobility of households (see Sabagh et al., 1969; Weinberg, 1979; Deane, 1990). One of the most simulating discussions of the housing market is found in Mayo (1981). In his paper, the supply of housing is differentiated by such variables as tenure, number of rooms, age, and location. Results reflect that the distribution of various types of housing really affect the direction of flow. From data of Benin City, Nigeria, Ozo (1986) provides evidence that the achievement of an ideal residential environment, even by those who have changed residences, remains far-fetched is largely an attestation to the shortage of good quality residential environment and thus reinforces the need for public investment in upgrading residential environments as well as expanding housing range.

Secondly, various incentives for home ownership at the local and provincial level, such as home ownership grants, regional low-income or low-down-payment lending initiatives, and provincial differences in rent control and regulation of housing markets have also been proved to influence households’ residential moving decision. For example, the impact of housing tax policy on the amount of owner-occupied housing has been examined many times in the past (Aaron, 1970; Rosen, 1979b; Rosenthal, 1988; Nordvik, 2001). Most analysts agree that high rates of inflation during the later 1970s increased demand for owner-occupied housing units and the benefits went disproportionately to upper-income households, due to a decline in the user cost of capital caused by the federal tax code (Diamond, 1980; Rosen and Rosen, 1980; Poterba, 1984; Follain et al., 1993). van Ommeren et al. (1996, 1999) find that in Netherland the effects on residential mobility of education, position at work, and home-ownership are not univocal, which could be due to the fact that the housing market is highly regulated. Moreover, many properties are owned by housing associations that use waiting lists and do not supply the property to the highest bidder. Since residential mobility is the process through which arbitrage of the housing stock take place, it is natural that higher arbitrage costs are associated with lower housing price. Those with less education or lower positions are more likely to be restricted to the regulated housing market which restricts moving.

Finally, issues of land rights and land market structure also are important factors, in particularly, in developing countries (e.g., Gilbert and Ward, 1985; Huang and Clark, 2002). In particular, when resale home market is slow in development, housing finance is limited, and the supply of affordable housing is skewed towards urban fringe, the condition of land market will more deeply influence households’ moving decision (Zheng et al., 2007).

One influential view in the literature regarding initial location and subsequent relocation of the low-income migrants follows from Turner’s (1968) model, in which the initial and subsequent intra-urban mobility depends upon the stage of urbanization of an area. In the early phase, the
central city is the recipient area. In the later phase, the increased preference for open space within larger city centers which tends to encourage some centralized residential development. Meanwhile, significant improvements in transportation for passengers, which reduce transfer costs and encourage decentralization of activities and residences within metropolitan areas. These migrant households move outward and are able to find employment and settle in the periphery (Conway and Brown, 1980). Meanwhile, the absence of a formal housing market available to migrants leaves them heavily reliant on informal social networks for information in their housing searches (Wu, 2006). However, Ahmad (1992) presents that relatively very few of the new arrivals to the city find their way into the central parts of the city in Karachi. He attributes this to easiness for the relatively poorer migrant to squat and put up low cost housing on vacant land at the periphery without proper government planning permission or control, and more availability at the periphery for informal-sector activities. In addition, when housing markets are largely unrestricted, mobility patterns seem to be linked to space (Clark and Huang, 2003). In general, larger the initial housing space, the less likely a move will be made subsequently. These findings conform to the general trend in residential mobility in that the search for more housing space often plays in an important role.

Local governments’ intervention and public goods provision. Local public sector may also effect the residential choice decisions. Similarly for the allocation of local public goods: movement over the lifecycle induces changes in preferences for locally provided services. The efficiency of locally provided services in the Tiebout (1956) sense can be achieved only if mobility is unhindered. Reschovsky (1979) provides an empirical test of the “Tiebout Hypothesis” that locally provided public services and the level of local taxes influences the mobility decision-making process. Using data on the number of in-migrants to a set of suburban communities with the Twin Cities metropolitan area, he provides support for the “Tiebout Hypothesis”, even in cases when no capitalization is expected. Housing policies such as rent controls and the administrative allocation of publicly owned housing in many countries have the effect of raising the cost of moving or effectively limit the number of moves which households can make.

Previous research on residential mobility has found that the many people never leave the private rental market unless they obtain government rental accommodation (Moffitt, 1992). Renters in rent-controlled housing markets have always been shown to move less frequently and consume less than optimal quantities of housing (Clark and Heskin, 1982; Turner, 1988; Coleman, 1988). Since a household moving from the private into the public sector is often unable to obtain the location it desires, they are unable to freely trade-off journey to work costs against housing costs. On the theoretical front, Hardman and Ioannides (1995) develop a model of the relationship between residential mobility and housing market, which it embeds in an overlapping-generations model of the housing market. They demonstrate that moving costs and constraints on moving can serve as a form of rationing of housing consumption which can be used in analyzing certain policy
interventions in housing markets.

While there are numerous housing programs, given the short public housing provision, households must wait to receive housing benefits. Because housing access is often based on a set of non-market eligibility criteria set up by governments, residential mobility tends to be very low (Szelenyi, 1987; Daniell and Struyk, 1997). Painter (1997) verifies the potential effect that variance in the length of public housing waiting lists may have on intra-urban mobility rates. Evidence suggests that intra-urban mobility is reduced by a small amount in metropolitan areas which have higher median waiting times and which have less variation across waiting list. In fact, a move into public housing affects not only the condition on which families are housed, but their labor market behavior as well (Engleman, 1977). Venti and Wise (1984) specify and estimate a model to evaluate the effects of proposed subsidy schemes. They demonstrate that government subsidy programs involve substantial deadweight loss even without consideration of moving costs. To obtain payments under these plans, a household has to relocate income to favor housing in proportion that may be far from its preferred allocation. As a consequence only a small proportion of families with initial market rents below the minimum will ultimately participate in these programs.

2.3 Mobility psychology

Uncertainty. Housing choices are made in an environment where the future values of influential variables cannot be totally predicted. The lack of perfect information implies that the mobility threshold and the search threshold may vary considerably, even for otherwise identical households with the same moving costs. Since surmounting these thresholds is usually made over time horizons of several years, this uncertainty can have important consequences for behavior. In general, in face of uncertainties, a household subjectively assesses the risks of committing himself to a particular home or apartment when he considers moving. The previous literature provides a set of tools readily applicable to the problems of location choice theory under uncertainty.

Firstly, income uncertainty arising from the likelihood of unemployment or unexpected income variability can affect housing demand and desired residential location in urban areas. Under a relatively weak assumption on the indifference map, DeSalvo and Eeckhoudt (1982) identify that unemployment compensation level of income and the probability of unemployment really affect the demand for housing as well as its associated spatial location. The empirical finding from Haurin and Gill (1987) lends further support to the contention that an uncertain income source is treated differently by a household compared with a certain source, and the housing consumption falls in response to increased uncertainty of income. Haurin (1991) justifies the hypothesis that less variable a household’s expected income stream, the more likely it is to own housing, and , if it selects ownership, the greater the quantity of housing. As Haurin empirically show, a 20% increase in the coefficient of variation of income reduces the ownership probability by 1.5
percentage points.

Secondly, residential mobility may be well based not only on where the current job is located, but also the expectation of where future jobs will be within the urban area. Since households are keeping their future options open, their ultimate choice of a place to live will be influenced by the uncertainty of their job change. Any one households’ current location is therefore as tied to the probability of working somewhere else locally as it is to the present job location (Crane, 1996). Therefore, as shown in van Ommeren et al. (1997), theories that ignore future job or residential moving behavior overstate the compensation for commuting which workers wish to receive to accept longer commuting distances, and they also overstate the payment which workers wish to forego to obtain shorter commuting distances.

Thirdly, since housing price is a user cost concept, price uncertainty may reflect uncertainty over possible capital gain or losses that may accrue as local land and housing market condition change over the consumption period. Rosen et al. (1984) argue that past price increases may stimulate families to become homeowners in order to reap the capital gains or increase their subjective uncertainty concerning future movements in price. If individuals are risk averse, this increase in uncertainty will discourage them from becoming homeowners. Turnbull et al. (1991) present a partial equilibrium model of housing and location demand under certainty. In their model, an increase in housing price risk decreases housing consumption if a household exhibits non-decreasing proportional risk aversion. This impact reinforced by locational choice because housing price risk causes the household to move closer to the CBD, which further reduces housing demand. These hypotheses have been supported by the following empirical finding. Hence, they suggest that measures of overall levels of and spatial variation in these risks need to be included in empirical specifications of housing demand in order to avoid specification bias.

Finally, as searches may result in a revision of the household’s prior estimate of the distribution of available housing and housing price (Weinberg, 1979), the value of an independent variable may also change in an unexpected manner for reasons essentially internal or external to a family (Graves and Linneman, 1979). These changes will exert both a direct or indirect effect via their effect on future expectations. The household’s final decision on moving will depend on the original accuracy of the household’s aspirations as well as the sequence of vacancies identified during his searching, since such factors affect the size, direction, and sequence of feedback effects (Brummell, 1979).

As suggested by Loikkanen (1988), search models can give a theoretically founded rationale for viewing residential mobility under uncertainty. He develops a search theoretic analysis of housing demand in which the decision to move can be split into two steps, namely searching and accepting received offers. A move is the result of a household passing through these two steps. The
household’s position relative to its equilibrium set determines whether it searches in order to move or not. Wheaton (1990) advances this literature by developing a matching model that clearly explains how with positive vacancy, matching, sales time, and prices are jointly determined. The uncertainty in his model arises from the assumption that mismatched households cannot find an appropriate house. Thus, the decision that searching households must make involves how much effort to put into searching. As more effort is engaged, it is more possible for such households to find their appropriate units. For the market as a whole, this will reduce the steady-state number of households that are mismatched, yielding an obvious gain in market efficiency.

In the previous studies it is also argued that search theory offers a useful framework for modeling spatial interactions between residential and employment location (e.g., Smith and Clark, 1982; Clark and Smith, 1982; Rouwendal, 1998). The search model specified is consistent with the common view that workers voluntarily accept commuting costs which are not compensated by the current characteristics of jobs and residences. Two reasons may be accountable for it. First, those who have recently changes jobs are likely to commute more, because it will take time to move to a residence closer to the new workplace location. Second, workers realize that commuting costs are temporary as they may change job or residence future. This notion has been supported by the evidence from some big cities that the average commute is pretty much the same throughout the area (Gorden et al., 1989).

Literature shows that a move may sometimes be sudden or unplanned (e.g., McHugh, 1984; Moore, 1986). Therefore, it is likely that the planning aspect of household mobility behavior may be obscured if the attention is only focused on the actual mobility behavior (Sell and DeJong, 1983). It points to the importance of considering households’ mobility expectation in modeling residential mobility. Although such a requirement certainly seems to fit with what is observed in reality, the question arises of whether it can be explained in the context of a model with residential mobility under uncertainty. Kan (1999) is among the first to examine the relations between mobility desires, intentions, and the actual behavior. The results indicate that socioeconomic variables which are likely to be accurately predicted by a household have almost no impact on actual mobility conditional on mobility expectation, although they may have significant influence on mobility expectation. Conversely, if the changes are unpredicted for a household, the household will tend to move even without prior planning. As a concomitant to his analysis, Kan (2002) has also reaffirmed that in the face of an uncertain future job location for the household head, a household will defer residential mobility until the uncertainty is resolved.

Risk aversion. If uncertainty is an important factor in household’s mobility decision, then the households with different degrees of risk aversion will show different tendencies for relocating their residence. In his seminal work, Andrulis (1982) considers the household’s decision to change within an urban area, when there is uncertainty regarding the future characteristics of the new job
or the new residence. Based on a sample of 434 observation from the Panel Study on Income Dynamics for the years 1971 and 1972 (PSID), he finds that risk aversion has implications for equilibrium location and the decision to move. In details, risk-aversers tend to move further from their jobs than risk-takers, when faced with an unanticipated wage increase, and closer to their jobs, when faced with an increase in housing prices. Under this condition, even if migrants are aware of opportunities in destination locations, the risk involved in migrating to new locations may be to strong a deterrent, as the costs of making a wrong decision are high. Kan (2002) expresses his doubt about Andrilis’ inaccurate estimation due to his arbitrary definition of risk aversion and ignorance of the multivariate nature of the dependent variables. In a following paper, Kan (2003), using individuals’ responses to a sequence of questions pertaining to hypothetical situations, employs a new measure of risk aversion developed by Barsky et al. (1997), which avoids the arbitrariness in Andrilis’ measurement of risk aversion. Using panel data to estimate a random effects multinomial probit model of households’ joint decision of residential and job mobility, their results show that risk aversion discourages a household from making any changes.

**Loss aversion.** Research has shown that people tend to strongly prefer avoiding losses to acquiring gains. This evidence has been interpreted to imply that people are loss averse: a loss from a reference state is thought to loom larger than a gain of equivalent magnitude. Loss aversion is first convincingly demonstrated by Kahneman and Tversky (1979, 1984) and extended by Kahneman and Tversky (1991). Although there is still no consensus on the normative status of loss aversion, there is a principled way of examining the normative status of these effects in particular cases. This seeming ubiquity is evident in the recent mobility literature. Genesove and Mayer (2001) firstly propose and test the relationship between listed housing price, time-on-market and potential loss, proving that loss aversion affects a household’s mobility decision. The basic hypothesis in their model is that homeowners treat gains and losses differently, and tend to strongly prefer avoiding losses to acquiring gains. Thus, sellers will list their current house at an above-market price and have longer time on the market in the hope of getting lucky to find a buyer with an offer high enough to attenuate the nominal loss. The approach is then supported by a stream of housing literature (Chan, 2001; Engelhardt, 2003; Wong and Chan, 2008; Tu et al., 2009).

Behavioral finance theory and related empirical research document that many investors tend to sell shares whose price has increased, while keeping assets that have dropped in value (Ferris et al., 1988; Tversky and Kahneman, 1992; Hong and Stein, 2000). This behavioral phenomenon, termed as disposition effect in Shefrin and Statman (1985), has been argued to be sometimes linked to, but is really distinct from loss aversion (Grinblatt and Han, 2001). Although it is possible to analytically prove that a potential seller, affected by the disposition effect, experiencing negative equity would be less likely to sell when expectations of further price increases are high, yet relatively little has been done in the mobility literature. Based on unique characteristics of mortgage foreclosure in Singapore, Ong et al. (2008), using a rich data set comprising foreclosure
and non-foreclosure transactions while controlling for no-sale, contribute to the literature by concurrently examining the loss aversion and disposition effect. They prove that there is disposition effect for non-foreclosure properties and individual homeowners are reluctant to sell when they suffer losses.

3. Empirical evidences

Empirically speaking, economists have studies intra-urban mobility of households in response to both economic and non-economic pressures. Reading through the literature, one cannot escape noting that there exist, as a concomitant to the theoretical analyses, several possible decisions which may lead to residential mobility. In particular, changes of workplace, tenure choice and residence spell can be set against a change of residential location. Furthermore, it is clear that residential movement within an urban area is occasioned by many factors other than changes of such decisions. In the following review, three major clusters of social economic and demographic variables and one class of psychological variables are examined for their contributions to intra-urban mobility studies: social and demographic variables, including personal characteristics and life-cycle; neighborhood and segregation, identifying ethnic or racial origin and religion; economic status, combining measures of income, occupation, and education as well as the psychological factors including risk aversion and loss aversion.

3.1 Impacts of life cycles

The reasons for changing residence within the city vary with the characteristics of the mover. A considerable body of research has been devoted to residential mobility and in particular to the household characteristics of movers. Many findings indicate that wealthier and better educated families are more mobile either in the sense of moving for exogenous reasons or moving more frequently to adjust housing consumption; movers are slightly older, have more job tenure, more likely to have been prior owners and are more likely to be married; married couples are less likely to be geographically mobile and more likely to have children and desire home ownership. See Weinberg (1979) for a fairly detailed review and comparison of this literature. In addition, if the head of divorces unexpectedly, he or she tends to move earlier, while if a marriage occurs unexpectedly, the household tends to stay longer (Haurin and Chung, 1998); religious persons have been proved to change residence less often (van Ommeren et al., 1996).

Since most movers are dependents, accompanying the head of a household, the family characteristics, rather than those of the individuals, are critical factors (Simmons, 1968). For example, family ties have been proved to an important pull factor in the initial settlement phase and continue to be important in the subsequent intra-city mobility in most large cities in the developing countries (Conway and Brown, 1980; Vaughan and Feindt, 1983; Ozo, 1986). However, it seems that the relevance of the family context may be more aptly expressed in terms
of the constraints thus imposed on the households’ moving decision.

Simpson (1980) suggests that the second earner’s job location may influence residential location contrary to the conventional assumption that second earner will take the residential location as given by the prime earner and search for work within the constraints thus imposed (Kan, 1999). The case of double-earner households attracts special attention because two wage earners share a dwelling, but have different workplaces, a situation that adds to the complexity of their residential moving decisions (White, 1986). Compared with the previous analysis on this topic by means of static models, van Ommeren et al. (1998) address this issue and focus explicitly on the consequences of future moves on current moving behavior of two-earner households by making use of search theory. They theoretically prove that a decision to move is not only affected by the commuting distance of the other wage earner, but is also affected by the distance between the workplaces of the two wage earners. Specifically, double-earners’ households move, on average, less often than single wage earner.

There is a widespread agreement that the family cycle model is probably much valid as an explanatory generalization, but far less agreement on the definition and measurement of that cycle. In fact, life cycle effect makes it intuitively clear that the family is quite likely to move as the result of important events which occur throughout a family’s lifetime. After his intensive follow-up studies on residential relocation, Rossi (1955) classifies about one out of three movers he studies as forced, coming as an aftermath of shifts in family composition that accompany life cycle changes. Many studies construct the life cycle variable which consists of six or seven stages occupied in succession by a person passing through a normal life cycle (e.g., Simmons, 1968; Speare, 1970). Results indicate that the propensity for movement is highest during the early stages of the family life cycle; as the family grows, the tendency for ties to specific residences increase, particularly when the household head retires from the work force. Since households have different priorities regarding housing consumption at different stages of life cycle, in order to predict future relocation behavior, therefore, expected changes in household characteristics should be considered (Clark and Onaka, 1983). A more complete treatment of life-cycle effects required that residential mobility should be studied as an event that occurs in continuous time. Unfortunately, few migration histories that would allow such analyses are available. Alternatively, the age of the head of household has usually been used as a proxy for life-cycle. Although life cycle and age are often used interchangeably in discussing migration differentials, they are logically distinct concept. Glick and Parke (1965) show that the life cycle experience of a birth cohort is by no means uniform. For example, person of the same age but at different life cycle stages are often quite different in their mobility behavior (Speare, 1970). Lansing and Kish (1957) point out that the stage of family formation is more accurate than age alone in predicting mobility. It seems that these studies focus too much on finding some optimal pattern to individual’s lives, and ignore the short-term constraints on behavior and the inertia effects which may be of greater significance to
the specific decision to move.

3.2 Neighborhood context and race discrimination

Apart from several aspects of household life-cycle decisions that result in mobility, the choice of a neighborhood is another important decision that reflects many considerations, of which housing is a key element. Accordingly, a mobility-prone household will have less incentive to invest in local social capital, because the stock of social capital that one has accumulated in one location will become less useful after it has moved. Since urban areas are strongly differentiated with respect to class, a person who changes his social status might be expected to change the location of his residence. Accessible guides to this literature are provided by Duncan and Duncan (1975) who look at spatial patterns in Chicago and argue that people tend to actively search out their “own kind” and to live with them. Reschovsky (1979) also provides the evidence that people generally prefer to associate with people of their own socio-economic class. In developing countries, as Ahmad (1992) show, intra-urban migrants prefer to settle close to friends or relatives, or in areas where the majority of households are of the same ethnic background<sup>16</sup>. The actual process of decision making is likely to be different for different groups implying that we need to structure the choice problem to reflect the different choice environments of different groups. Another important implication is that neighborhood amenities considered desirable by movers deter relocation from origins and encourage migration into destination, and vice versa for undesirable amenities. If a household anticipates any neighborhood changes that eventually occur when it moves into a neighborhood, then it is less likely that the household will move in response to such changes, ceteris paribus.

An early study by Boehm and Mark (1980) is the first to provide an economic analysis of mobility decision within inner-city neighborhoods. Their results suggest that a household’s perceptions regarding the quality of the neighborhood are important as determinants of potential mobility. Unfortunately, the absence of data on changes in neighborhood quality may result in incorrect estimation. Boehm and Ihlanfeldt (1986) provide more evidence on the importance of both level of neighborhood quality and its change which cause residential mobility within a city. The evidence indicates that households’ perceptions of the level of neighborhood quality and its change have an important effect on the mobility decisions for both renters and homeowners residing within central cities. Deane (1990) shows that the predicted proportions of persons wishing to move by neighborhood dissatisfaction are higher than by housing dissatisfaction, and the magnitude of the increase in predicted proportions by successive level of neighborhood dissatisfaction is much greater than the increase by housing dissatisfaction, particularly among the owners.

In general, previous attempts try to capture neighborhood effects normally consists of a single survey item asking people to rate their area of residence. Among investigations that consider
neighborhood more fully, agreement is minimal as to which characteristics shape mobility behavior. The neglect of basic conceptual considerations may account for this. After reviewing a series of conceptual issues with reference to residential mobility, Lee et al. (1994) estimate the impact of neighborhood context on mobility thoughts and on actual mobility in a sample of Nashville residents. Their results suggest that aspects of neighborhood context play a key role in mobility decisions. Of the several conceptual dimensions identified in this paper, as they argue, the distinction between neighborhoods as a subjective and as an objective context seems most valuable. Ioannides and Zabel (2003) define the demand for housing to include services emanating both from structure and neighborhood. Under this definition, they develop and estimate a model of the continuous housing services demand that is influenced by the average of one’s neighbors’ housing demand. Both endogenous and contextual neighborhood effects have been found from the national sample of the AHS. The former implies that individual housing demand is affected by the mean housing demand of one’s neighbors. The latter suggests that individual housing demand is influenced by the neighbors’ characteristics. Later, Ioannides and Zabel (2008) extend their former works by modeling the demand for housing and neighborhood choice as a joint decision, where neighborhood choice is discrete and housing demand is continuous. The results for the neighborhood choice model indicate that individuals prefer to live near others like themselves.

Social capital can enhance neighborhood stability and promote neighborhood cohesion by encouraging residents to prolong their length of stay. Since social capital is location-specific, a household simultaneously makes decisions on local social capital investment and residential mobility. To account for the endogeneity of local social capital, Kan (2007) adopt Durlauf’s (2002) approach by modeling social capital together with the behavioral choice as a system of equations. By doing so, he proves that the possession of local social capital is especially dampening to long-distance mobility, while its effect on short-distance mobility is insubstantial. However, some researchers regard longer residence spells not as stability, but as immobility, and therefore as a cost rather than a benefit (Coulson and Fisher, 2009). Implicit in this claim is the hypothesis that serious limitations on residential choice are responsible for the low rate of employment for renters.

One view of the spatial mismatch hypothesis is that radical minorities face more discrimination in housing markets than in labor market. Lack of evidence of longer commutes for blacks has been used as evidence of lack of housing discrimination in the housing market (e.g., Price and Mills, 1985; Zax 1994; Ihlanfeldt and Sjoquist, 1998). The differences in white and nonwhite mobility are assumed to be the differences in the distribution of prices facing the two racial groups due to racial discrimination (Courant and Yinger, 1977). If a more favorable distribution of housing prices exist for whites, their expected gains to search would be greater, resulting in higher moving propensity. Schnare (1980) reports that the average SMSA became more segregated between 1960 and 1970. Black neighborhoods are typically concentrated in older parts of central cities. This geography prevents blacks from consuming newer housing or the amenities associated with
suburban residence. Cronin (1982) finds that minorities tend to avoid certain neighborhoods in their search for a suitable housing unit in expectation of discrimination; and if they do move, it takes a long time for them to locate a suitable housing unit. Zax and Kain (1991) demonstrates that quits and moves by workers whose residential choices are constrained by segregation should be relatively insensitive to commutes. Consequently, black residences were closer to the workplace that white residences and more concentrated. Racial prejudice could also be reflected in the current housing choices of whites and nonwhites, since current choices depend on past search efforts. As a result, white would choose to live in more attractive housing units than nonwhites. This will decrease the expected gain to searching for whites, thus decreasing moving probabilities, ceteris paribus. For example, as Gronberg and Reed (1992) show, white renters are more mobile than nonwhite renters, whereas white owners are found to be less mobile than nonwhite owners. It is worthy of note that studies of ethnic and racial groups, admittedly, have generated a complex, and often contradictory, body of theory about their intra-urban movements (e.g., Simmons, 1968; Krumm, 1984; Kan, 2002, 2007). One reason accountable for this is that compared with the minorities in the early twentieth, the present-day groups may have different problems and live in the cities with dissimilar patterns of interaction and opportunity.

3.4 Permanent income vs. transitory income

Since housing consumption in particular may be affected by the long-run prospect of income rather than by a single-year measured income, households may look beyond their current income in making housing decision. The pioneering work by Lansing and Morgan (1955) shows a strong relationship between homeownership status and stage in the life cycle, and generally only a weak linkage between homeownership and current income. It implies that if a various future income sources have different expected variances, a simple summation to total income in not appropriate. Different methods have been used to deal with the problem of estimating the permanent income. Livitan (1963) suggests that for any year of analysis the use of lagged measured income as instrumental variables yields a powerful test of the permanent income hypothesis. As Lee (1968) has noted, it is more desirable to use reinterview data spanning three years so that a two-year lagged income may be used as an instrumental variable for permanent income. Whereas a distributed lagging approach may work for a fixed stochastic aggregate income pattern, it will result in a bias on the household level if households can readily distinguish permanent changes. Moreover, this method ignores the impact of expected future income exerted on housing demand, probably overestimating demand for those nearing retirement and underestimating demand for young home buyers.

Since the transitory income components tend to cancel out in the grouped data, some analysts use either grouped data or multiyear averages of measured income as indicators for permanent income (e.g., deLeeuw 1971; Vaughn 1976; Dynarski 1985). Although individuals may correctly respond
to changes in their income, they may not fully respond to business cycle fluctuation which may 
appear to them as somewhat minor events. Therefore, grouping tends to give the wrong answers 
and is subject to a subtle type of simultaneity bias by including supply effects. Alternatively, some 
researchers use a predicted value of current income to represent permanent income. Gillingham 
and Hagemann (1983) estimate an income determination equation, specifying measured income 
before taxes as function of a vector of household, employment and location characteristics. They 
then take the prediction from this equation as a proxy for permanent income. Zorn (1988) suggests 
that the present value of the household’s future income stream should be obtained by first running 
a Tobit estimation which regresses individual’s current income on variables representing their 
human capital, because not all adults in the sample work and consequently many individuals have 
a value of zero for current income. An advantage of using a measure of permanent income in the 
estimation is that it converts household’s wealth into a flow variable, which is consistent with the 
treatment of other variables in the model. Obviously, the validity of these findings largely depends 
on the efficacy of the instruments.

In reality, the introduction of institutional considerations, such as imperfection of capital market 
and the downpayment constraints, leave an important role for transitory income to play in the 
major decision to purchase a home. Goodman and Kawai (1982) and many followers compute 
permanent and transitory incomes by using instrumental variables related to human and nonhuman 
wealth. Using a cross-sectional sample, the permanent component is assumed to be the predicted 
value of income derived from a regression of current income on a set of household characteristics. 
The transitory component is the difference between current income and its predicted value. The 
significantly positive transitory income coefficient leads to rejection of the hypothesis that 
transitory income should have no impact on a housing demand function. Dynarski and Sheffrin 
(1985) further shows that households appear to respond strongly to transitory income and the 
decision to purchase a home for existing renters is strongly influenced by transitory income. The 
asymmetry in the response to caprice, luck and chance may figure predominantly in decisions to 
purchase housing on the micro level. One problem with these studies is that because only 
cross-sectional data are used, the estimation error may contain party of permanent income. A 
solution is to allow for a fixed effect. Henderson and Ioannides (1986, 1987) suggest a substitution 
of wealth for permanent income, which allows us to exclude the indirect effects where age may 
also pick up life-cycle variations of income on demand\textsuperscript{19}. However, Haurin (1991) argues that 
because labor supply is a choice variable, the use of permanent income as an explanatory variable 
is inappropriate in housing choice models unless restrictive assumptions are placed on the range of 
a household’s potential labor supply behavior\textsuperscript{20}. Alternatively, he develops an approach based on 
an intertemporal model of consumption with endogenous labor supply\textsuperscript{21}. Empirical results indicate 
that data requirements are similar, but the match with theory is superior.

3.5 Psychological factors
Andrulis (1982) examines how risk aversion affects the joint decision of residential and job mobility. The results predict that risk aversion discourages any moves, and it has a more negative impact on single moves (either that of the job or the residence) than on joint moves. The empirical work confirms the prediction, but suffers two weaknesses: (1) the definition of risk aversion is arbitrary, it is defined as a score by a weighted summation of a set of binary variables, and (2) the multivariate nature of the dependent variables is ignored. It is concluded that the effects of risk costs are qualitatively different from those of transaction costs and changes in commuting costs.

Transaction costs discourage all change, especially a simultaneous change of both workplace and residence. Commuting costs encourage joint changes over single change. Risk costs discourage moving for risk averse households, but encourage joint moves to suburban locations over single move and risk costs encourage home-ownership over renting. Risk-avers tend to move further from their jobs than risk-seekers when faced with an unanticipated wage increase, and closer to their job when faced with an increase in housing prices. In his paper, he characterizes risk aversion for a household faced with risk regarding both income and housing price.

Kan (2002) extends the work of Andrulis (1982) and Crane (1996). A residential move is a discrete adjustment to housing consumption, which may occur in response to changes in an individual’s circumstances and housing market conditions. The two actions are related in a complex manner through the costs associated with the journey to work. In the absence of transaction costs of moving, uncertainty will not be an issue, and individual will move in reaction to any changes in their circumstances no matter whether there is any uncertainty or not. In the presence of transaction costs of moving, frequent mobility may not be optimal and job location uncertainty may inhibit an individual from moving in response to changes. Kan develops a binary probit dynamic econometric model to understand the dynamic process of how an uncertain future job location affects households’ residential move. His focus is on the econometric implementation given a dynamic choice process under uncertainty, not on risk aversion effect caused by uncertainty. Job change tendency indeed has a negative effect on residential mobility and a positive effect on mobility expectation. Kan (2003) used panel data to estimate a Random Effects Multinomial Logit model of households’ joint decision of residential and job mobility. A household’s degree of risk aversion is a confounding factor in the joint decision of residential mobility and job changes. The empirical results show that risk aversion discourages a household from making any changes.

Genesove and Mayor (2001) provide the first non-experimental evidence on loss aversion using data on Boston condominium sales. They find that owners for whom the expected sales price is below their nominal purchase price set 25-35% higher asking prices, receive 3-18 higher prices when they sell. Engelhardt (2003) uses household mobility data to distinguish between the competing theories of loss aversion and equity constraint (Stein, 1995). He finds that nominal loss aversion resulting from declines in house prices for financially constrained owners has a much
greater effect on mobility than does a decline in house equity below financing constraints. Both provide evidences that loss aversion prevents households for moving.

3.6 Estimation methods

What cause a household to move out of its dwelling are typically estimated using probit methods. Because moving decision is necessarily conditional on having initially preferred the original location, the disturbance terms in models of this decision is likely quite complex, and unlikely to follow the simple distribution required for probit estimation. Alternatively, Bartik et al. (1992) suggest that maximum score estimates which are less sensitive to outlier observations be more precise than discrete choice models based on incorrect distributional assumption, but at a cost: the estimates describe the median household, rather than average behavior for all household. Their results suggest that maximum score estimation prove superior for modeling “reversing decisions” for which the usual Probit or Logit assumption are incorrect. Given the correlation between various expected appreciation measures, a precise estimation of mobility which includes expectation entails researchers to select measures a priori. When the housing investment aspect is included, as noted by Kiel (1994), stratification of the sample is more needed. Inappropriate assumptions on the disturbance term of Probit or Logit estimation again call for other techniques. Kiel argues that the nonparametric technique known as classification and regression trees (CART) can serve as an ideal alternative. The CART allows the researchers to enter collinear variables, provide them with insight into the predictive structure of data, and help them uncover the predictive structure in problem. Using American Housing Survey data and the CART technique, Kiel shows that homeowners with higher future appreciation are likely to move; this result is the opposite of the parametric results.

4. A unified view of modeling residential mobility

4.1 Multi-period frameworks for intertemporal analyses

A few studies have addressed the importance of studying mobility from temporal viewpoint because a decision to move involves a dynamic decision making process. For example, although an equilibrium solution does exist for a multi-period problem, analytical solutions are not readily tractable for multi-period models. The two-period framework used in those studies, while useful for exposition, ignores the decisions on how long to stay and how often to move. The nature of the disequilibrium concept under the two-period framework is thus somewhat myopic. In a multi-period model, the household’s decision to move at certain time may lead to different patterns of subsequent moves. As noted by Goodman and Wassmer (1992), changes in price, incomes, and preferences may affect demand and mobility in stays prior or subsequent to the actual change. Moving one period earlier or later changes the vector of income and prices, as well as the degree of homogeneity of preferences within a given stay. To address intertemporal housing demand in the presence of transaction costs, Goodman (1995) proposes a model for addressing
mobility and moving costs in a multi-period optimization that permits various degrees of consumer borrowing opportunities. Within an equilibrium framework, his model generates endogenous numbers of moves, residential duration, housing demand, and non-housing consumption. Since the richness of the model with respect to solving the number and the timing of moving lies in the generality of the treatment of incomes, prices, and preferences, it is useful to examine a variety of patterns. For example, he examines that moves occur even if the discount and interest rate are the same, since changes preferences, prices, or incomes may also lead to desired moves. This finding contradicts with Amundsen (1985), who, suing perfect capital markets, shows that moves are desirable if the discount rate and the interest rate differ. To overcome the traditional static assumption on owner cost, Haurin and Chung (1998) synthesizes the previous fragmented approaches by consolidating into one measure the standard user cost of owning, transaction costs and the expected length of stay. They estimate the planned length of stay of owners using a parametric hazard rate model developed by Peterson (1986). Given the occurrence of unexpected events and their impact on the measured length of stay, they also project paths of influential variables and compare these paths with subsequent realizations. It enables them to complete the measurement of a multi-period version. The results support that their multi-period transaction adjusted user cost performs better than the static form. Nordvik (2001) adds to our understanding of the dynamics of housing demand by analyzing housing demand as a dynamic plan, which depends on the expected time-path of moving costs and prices, of housing consumption over the life cycle. Compared with Goodman (1995), his model is somewhat more flexible as he explicitly allows prices and parameters of the utility function to vary over time. Through simulations, he demonstrates how a dynamic plan can be revised as exogenous variables change, and how demand reaction towards such changes depends on the date when the consumer is informed about the changes. Since these attempts rely on simulations on calibrated models in order to give quantitative indications of the dependencies within the models, a sounder basis of empirical analysis seem needed.

Incorporating the above multi-period modeling approach into the reviews in the previous sections, we conclude that modeling a household’s mobility decision making process demands a unified approach by considering both the factors motivating a move as well as the constraints and the psychological impacts on a moving decision, theories drawn from urban economics, financial economics as well as behavioral economics may aid us to improve our understanding on mobility behavior, and vice versa.

4.2 A unified view based on measurable concepts

While yet the existing literature provides insights and understanding on the residential relocation choices for different demographic groups in market economies where the freedom of housing choice is granted and market prevails, there are many inconsistent evidences and ambiguous
findings on the correlates of households’ propensity to move in urban areas. How can these apparent differences in opinion be synthesized and reconciled? In our view, a useful model of residential mobility should be based on a perspective that a household makes its mobility decision as a weighting of the positive and negative factors at the origin versus those at the destination, which are highly influenced by its psychological status and governed by a utility function incorporating information about quantities, locations and constraints set by available budgets of money, searching time and the distribution of different kinds of housing.

For a high degree of generality, our view of residential mobility is closer to that expressed by some economists. That is, a residential move is seen as a consequence of disequilibrium between a household’s desired and actual combinations of housing consumption and housing investment. A household drifts out of equilibrium as changes in its mobility motivation and constraints render its dwellings less than optimal.

As a household evolves along its life-cycle, its desire to consider moving results from a change in its needs both for consumption and investment or in neighborhood amenities. When residents are confronted with a powerful stimulus for moving, their response typically takes many forms. Moreover, there exist, as we have seen, several possible decisions which may lead to residential mobility. In particular, changes of workplace, tenure choice and residence spell can be set against a change of residential location. These choices are not independent since any decision with regard to one might alter the parameters of the choice with regard to the other even if a joint decision is not taken. Meanwhile, an intra-urban move is also determined in terms of the interaction of a series of constraints. Some are imposed by the needs and preferences of the household, and others by the availability and tightness of residential housing supply in different neighborhoods and by the accessibility to mortgage funds, equity loans, and other flexible financial instruments. In addition, adjustments made to improve or maintain a home as a means of enhancing or protecting the investment also serve as constraints to mobility. In this context, a household is supposed to move if the value gained by changing housing expenditure outweighs the transaction costs associated with moving. Macroeconomic conditions such as housing appreciation and changes in mortgage interest rates will affect the optimal timing of trading up.

However, uncertainty destroys the perfect correspondence between a household’s residential relocation and the magnitude of its mobility motivation and constraints. In face of uncertainty, a household does not make its moving decision instantaneously to changes in prices, preferences or family composition but deters its residential mobility until the uncertainty is resolved. Each household has some prior estimate of the distribution of available houses and their associated prices. Given the information available, the household must decide to be a stayer or a mover. This decision depends not only on the time path of events known with certainty and the difference between the realization of a stochastic event and its forecast value, but also on the household’s
attitude towards negative changes (i.e., losses) and positive changes (i.e., gains). In words, to better understand a moving decision as a long-term planning, one should analyze expected moving activity within a framework which allows for unexpected moves and accounts for the different responses to stochastic events from households with different degrees of risk aversion.

5. Concluding remarks and implication for further research

The last decades have witnessed a change in interdisciplinary research on intra-urban mobility where the boundaries of different areas have overlapped or even disappeared. These integrations have proved useful in substantiating problem-solving approaches with reliable and robust techniques to handle the increasing demand from practitioners to solve real-life problems. This review attempts to make some important statements about what has happened with the economists’ works in this area over the last decades and what the implications of those changes are. To summarize, intra-urban mobility can be best understood if the residence is envisaged as a local good, which cannot be transferred to another location. Individual makes mover-stayer decisions to accommodate changes in family structure, social status, investment preferences or neighborhood amenities from a set of preferences, opportunities, and accessibility considerations. For economists, households have been viewed as continuously determining whether to move or not and the level of housing consumption conditional on moving, with such decisions taken in a lifetime perspective accounting for moving costs and the stochastic nature of the budget constraint. A move is expected to occur if the present discounted sum of the expected utility losses associated with disequilibrium consumption exceeds adjustment costs. In this context, a large disequilibrium value is associated with a greater likelihood of moving.

While we have come a long way on our explanations into the analysis of intra-urban mobility, we are still travelling. In particular, residential mobility in emerging economies such as the socialist and transitional economies is poorly understood. On the theoretical front, extensions of the present work, either by relaxing the assumption, or by expanding the set of hypothesis to be tested, constitute areas for future research. For example, it would clearly be desirable to make the model an explicitly intertemporal one, in order to endogenize the evolution of families’ debt levels, and to generate sharper predictions about the time series behavior of residential moving decision. Some elements of the real world look more pivotal than others, depending on the problem at hand. Their absence from a model may limit the usefulness of theoretical results as well as the validity of subsequent empirical strategies. For example, related research on multiple-worker households have begun to explore the implications of more than one workplace decision and commute balanced against a household residential location choice. To date, researches concerning these patterns have been largely descriptive. Addressing this issue will acquire developing a more sophisticated household-individual choice that allows individual choice to be integrated into a larger household choice model.
On the empirical front, a fuller understanding of the explanatory power of a set of predictor variables has been empirically gained via the multiple classification and subsequent categorical multivariate analysis of the variables of that set. It seems predicated and borne out in these attempts that a simultaneous undifferentiated analysis of the entire set of variables attenuates understanding, while analysis of categorized variables leads to enhanced understanding of the dynamic phenomenon being studied. However, in contrast to the concern with changes that are explicit or implicit in the existing theoretical framework, the empirical analyses of intra-urban mobility to date does not have shed some light on the relevancy of the explanations, but also leave a lot to be desired. This may be mainly due to differences in the geographical pattern and the socio-demographic structure of the various economies.

Since the past analyses seem quite dependent upon the particular sample and the level of aggregation employed, the results must be evaluated with care. Firstly, many attempts to analyze the determinants of intra-urban mobility have been conducted within a cross-sectional framework. The existence of adjustment costs suggests that household do not respond immediately to changes in their desired housing consumption. Therefore, the notion of equilibrium demand apparently underlying the concentration on recent movers is vague and suggests an atemporal world of myopic behavior. In the absence of the appreciate panel of individuals, the estimation of housing demand models from cross-sectional data could give misleading impressions about the true demands for housing, at least, if the adjustments follow a complex pattern. Secondly, sampling error is likely to be high due to the small fraction of households in the categories examined in each data case. For example, householders who omit various stages of the family cycle model, those who move across the city for purely status reasons and those who migrate to the readily localized government housing areas will distort the simple picture hypothesized. What it does imply very clearly it that the timing of the move and the nature of the move examined will influence the distribution of reasons for moving. Finally, the majority of the literature focuses on the voluntary movers. However, in practice not all moves are made voluntarily. This difficulty arises principally because of no consensus about which kinds of moves are involuntary. It seems that at least as much effort needs to be applied to the analysis of voluntary migrant as to the involuntary migrant to understand what differences in search patterns exist, if any.

A potentially serious methodological problem is that variables defined for the end of the period are frequently used to explain residential mobility that occurred over the period. Similarly, variables relating to a change are used to explain residential mobility that occurred over the same interval. Also, the measure of mobility is sometimes truncated. Partly as a result of the various period of analysis, much of the research reported by individual scholars is highly ambiguous, or at least difficult to interpret. Because moving is itself likely to influence end-of-period economic conditions, simultaneous equation bias will result in unanticipated signs or insignificant coefficients on such variables. Therefore, application of simultaneous equation techniques to the
analysis of the joint dependency of the determinants and consequences of residential mobility is needed. Moreover, since many data set used in the current studies do not measure the distance of residence relocations, it cannot be determined whether either of these census units conforms very closely to the territory most influential in mobility decisions. In consequence, the interpretation of estimates regarding the determinants of this mobility must be uncertain. In addition, most former empirical research has emphasized the role of variables measuring the current status of households, rather than changes in their status. Two types of changes should deserve more attention. Those which occur (or at least begin) in the recent past are most prominent in speculation on how status change affects mobility. Evidence is also expected to emerge that expectations about future change may inform residents’ decisions to move or stay. Whichever type of change proves more important, the general point remains the same: change variables should be prerequisite to an empirical examination of the determinants of intra-urban moving behavior.

Two different types of mobility measures serve as dependent variables in most of the studies. The first is a survey item about mobility propensity, designed to tap any preexisting inclination toward movement. The second measure captures actual mobility during the year after the survey. Although the former one is clearly concerned with future action, it lacks the degree of certainty or conviction implied in most research on mobility decision. Furthermore, retrospective questions are subject to the distorting effects of memory loss and rationalization. As a result, it may elicit a greater number of affirmative answers than do those questions, but may predict subsequent behavior less strongly. The second measure has always suffered from both small sample size and sample attrition, which can lead to bias, as non-respondents are disproportionately mobile. Because many data sets do not measure the distance of residential location, the empirical distinction between intra- and inter-urban mobility is imprecise when changes in the political jurisdictions or census tracts of residence serve as proxies for residence relocations. As a supplement to this variable, the self-selection mortgage contracts could be used to infer expected mobility from the choice of points. As Chan (1996) demonstrates, a household’s expected mobility can be inferred from the choice of mortgage contract. Mortgage application data have the unique characteristic of being able to tell us exactly where households want to move. Meanwhile, both the household’s address at the time of the application and the desired address are available. This information can be matched with data on the characteristics of those particular areas. It promises potential fruitfulness of using mortgage application data for mobility research.

On the basis of research to date, it is difficult to determine which comes first: do people change their way of life and then seek a more suitable environment, or do the physical surroundings modify the way of life? Observations of this type recall the chicken-egg controversy. Although the technical complexities involved are partly responsible for this harsh assessment, a neglect of basic conceptual considerations frequently underlies failures to demonstrate such effects. Shlay (1986) provides provocatively evidence that it is the way dwelling are bundled and offered on the markets
that leads American to prefer ownership. If Shlay’s findings are correct, many disturbing questions will be raised about whether we have properly interpreted households’ preferences for homeownership. Does a household prefer to own its homes, or does he prefer the kinds of dwellings that are usually offered for sale? Ideally, one would like to study not only the household’s residential and workplace mobility decisions, but also actual locational decisions, model choice of work trips, and asset ownership decision, particularly on autos and homes.

There is little uniformity in the demographic variables that are used in different analyses, making it difficult to compare demographic effects across analyses. In collecting survey data on reasons for moving, it is thus important to standardize the time of interval, the geographical distance of move, the unit of observation, and the type of mobility decisions. Firstly, the appropriate econometric techniques depend on the scale of the mobility under examination. Hence, empirical studies should incorporate the distinction between inter- and intra-urban mobility with data set that corresponds well to the concepts at issue. Secondly, the generality of conclusions stated above is also subject to verification by confronting the hypotheses tested in related papers with other sources of data in other countries having similar characteristics. Many factors may favor moving in one country, in other countries such factor may be unimportant, neutral, or biased towards staying. In fact, the land use development and management, the traditional practice of land assignment and housing allocation have severely limited the operation of an open market normally assumed in western models. The current models based on open market assumptions are therefore not particularly applicable to most cities in developing countries. In developing a general theoretical framework, it is desirable to first concentrate on the non-institutional economic aspects of the problem, and then introduce consideration of country-specific institutional factors such as the tax system. Finally, most empirical analyses on determinants of intra-urban mobility parameter in one country alone, often suffer from the lack of a counterfactual due to the lack of exogenous shocks precipitated by policy regime changes. The possibility of pooling the data from more than one country with very different cultural and historical backgrounds can offer us more variation in the explanatory variables.
### Table 1: Empirical evidence about mobility motivations

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<tr>
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<tr>
<td>Johnston (1967)</td>
<td>Urban studies, 6, 34-57</td>
<td>A survey conducted by the 1964 Melbourne Metropolitan Transportation Study and the 1963 Census of the Australian Capital Territory</td>
<td>N/A</td>
<td>N/A</td>
<td>Tabulation method</td>
<td>The patterns of intra-urban mobility in Melbourne are probably much more valid as an explanatory model.</td>
<td>As one of the early works this study is more descriptive and a more formal mathematical form is needed.</td>
</tr>
<tr>
<td>Brown and Longbrake (1970)</td>
<td>Annals of the Association of American Geographers, 60, 368-384</td>
<td>A sample of actual intra-urban migration flows for Cedar Rapids, Iowa (1966-1968)</td>
<td>Population turnover rates</td>
<td>Family status, housing quality, income differentials, residential density and selective stability</td>
<td>Principal components analysis and single-equation linear model</td>
<td>Factors identified as most important in guiding intra-urban mobility are the aspirations of the household with respect to housing and the spatial characteristics of the vacancy market.</td>
<td>The result may suffer by the fact of its reliance upon ecological correlation procedures.</td>
</tr>
<tr>
<td>Moore (1971)</td>
<td>Economic Geography, 47, 59-72</td>
<td>A ten percent sample of annual electoral register for the inter-censal period 1954-1961 in Brisbane Metropolitan Area</td>
<td>Population turnover rates</td>
<td>Population density, family life cycle and home ownership</td>
<td>Single-equation linear model</td>
<td>When attempts are made to model patterns of population turnover in a monocoenetic city, regression analyses have little impact either in terms of reliable short-run predictions or in identifying ecological relations.</td>
<td>These findings imply that the utility of ecological models is very sensitive to the quality of available data.</td>
</tr>
<tr>
<td>Staines and Fisher (1974)</td>
<td>Journal of Regional Science, 14, 65-80</td>
<td>A cross-section of 100 geographic subareas of Chicago Metropolitan Area</td>
<td>The number of residents who are classified in four categories by their race-occupation type</td>
<td>Employment, employment potential, area's nearness to the ghetto and residential land-use variable</td>
<td>Semi-structural model</td>
<td>The importance of the attachment to employment as an exogenous determinant of residential location should be questioned.</td>
<td>The models used in this study do not explicitly recognize the problems of time and dynamics.</td>
</tr>
<tr>
<td>Siegel (1975)</td>
<td>Journal of Urban Economics, 2, 229-47</td>
<td>Home Interview Survey conducted by the Bay Area Transportation Study Commission</td>
<td>Households' joint decision of employment and residential location</td>
<td>The relationship between the home, geographic center of all jobs and the average time of all jobs</td>
<td>Simultaneous model</td>
<td>Both the home and job location are responsible to each other. There does not appear to be strong evidence for discrimination in the cost of housing in the area targeted.</td>
<td>Such findings imply that decentralization of population is not due solely to rising incomes and will continue as long as industry decentralizes.</td>
</tr>
<tr>
<td>Staines (1977)</td>
<td>Journal of Urban Economics, 4, 69-79</td>
<td>Census of Manufacturing and Business and Census of Population (1958, 1963, 1967, 1972)</td>
<td>Percentage of SMSA residents and employed in their working, respectively, in the job central city</td>
<td>Percentage of SMSA population that is white and trend variable</td>
<td>Time-series model</td>
<td>Casualty runs from residence to employment, not vice versa.</td>
<td>This paper first tries to make extensive use of pooled cross-sectional time-series data in an attempt to determine whether residence and employment are reacting to each other's past.</td>
</tr>
<tr>
<td>Hanushek and Land Economics, 54, 411-429</td>
<td>Housing Allowance Demand Experiment in Pittsburgh and Phoenix (1973-1976)</td>
<td>A dichotomy of movers and non-movers and households' joint decision of search and residential location</td>
<td>Changes in equilibrium housing demand</td>
<td>Dichotomous and trichotomous probit models</td>
<td>The importance of changes in equilibrium housing consumption in motivating both search behavior and the possibility of more rapid changes in urban areas than would be implied by aggregate analysis.</td>
<td>The models are based on the assumption that disequilibrium in specific components of the housing bundle has indifferent effects on moving behavior.</td>
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<tr>
<td>Reschovsky (1979)</td>
<td>Journal of Urban Economics, 6, 501-520</td>
<td>A survey of residential choice in Minnesota (1970-1971)</td>
<td>Number of households moving to each location, number of households moving into owner occupied units and rental units respectively</td>
<td>Accessibility index and fiscal variables including total effective tax rate, per capita municipal expenditure and school test scores</td>
<td>Single-equation linear model</td>
<td>Local public sector affects the residential choice decisions of various income and housing tenure groups even in cases when no capitalization is expected in quite different ways.</td>
<td>The results support for the Tiebout hypothesis, in quite different ways.</td>
</tr>
<tr>
<td>Weinberg (1979)</td>
<td>Regional Science and Urban Economics, 9, 219-246</td>
<td>A home interview survey of San Francisco Bay Area Households (1965)</td>
<td>A dichotomy of movers and non-movers</td>
<td>Change in workplace, travel time and neighborhood quality</td>
<td>Linear probability model</td>
<td>Residential and workplace mobility decisions are made independently.</td>
<td>This study ignores the basic correlation structure among the various options and may result in the sum of the estimated probability impacts exceed unity.</td>
</tr>
<tr>
<td>Booher (1981)</td>
<td>Journal of Urban Economics, 8, 375-389</td>
<td>A survey conducted by the Survey Research Center at the University of Michigan (1968-1976)</td>
<td>Probability of simultaneously making a tenure choice and expecting to move in the near future</td>
<td>Age, family wealth, permanent income, relative cost of owning, housing value, absolute price of homeownership and lagged percentage changes in annual house prices for the local market</td>
<td>Multinomial logit model</td>
<td>It recognizes the simultaneous relationship between a household's tenure choice and its expected mobility.</td>
<td>It suggests that policy makers can effectively promote urban stability through various means which simultaneously influence the household's tenure and expected mobility decisions.</td>
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### Table 1: (Continued)

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<thead>
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<th>Papers</th>
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<tbody>
<tr>
<td>Alperovich (1983)</td>
<td>Journal of Urban Economics,34,280-292</td>
<td>Unpublished files at the Israel Central Bureau of Statistics (1967-1978) and a special survey conducted in 1977</td>
<td>Rate of migration and gross migration</td>
<td>Neighborhood amenities</td>
<td>Single-equation linear model</td>
<td>Nonsubjective neighborhood amenities are shown to be relevant and important in shaping intra-urban migration pattern.</td>
<td>In this study, performance of most of the subjective amenity variables turn out with a wrong sign.</td>
</tr>
<tr>
<td>Shear (1983)</td>
<td>Southern Economic Journal,49,1030-1052</td>
<td>AHS (1974-1977)</td>
<td>Households' joint decision of moving and rehabilitation</td>
<td>Neighborhood amenities and dwelling</td>
<td>Multinomial logit model</td>
<td>Demand shifts affect the rehabilitation decisions of non-movers. The effects of neighborhood change are most evident in the move decision.</td>
<td>It appears unlikely that move decision by households can be adequately explained without relating it to the rehabilitation decision.</td>
</tr>
<tr>
<td>Krumm (1984)</td>
<td>Journal of Urban Economics,8,259-271</td>
<td>PSID (1977-1978)</td>
<td>Households' joint tenure choice and migration decision</td>
<td>Household characteristics and urban</td>
<td>Multinomial logit model</td>
<td>Households' tenure choice and migration decisions are intertwined. Relationship between racial status and mobility is not straightforward but rather is intertwined with the housing ownership question.</td>
<td>As the findings in the study indicate, the effects of exogenous variables likely to affect one of these decisions directly often depend on other decisions involved.</td>
</tr>
<tr>
<td>Landale and Guest (1985)</td>
<td>Demography,22,199-222</td>
<td>Interviews with adult residents of the Seattle Metropolitan Area and a follow-up interview one year later (1978-1979)</td>
<td>The desire to move and actual mobility</td>
<td>Satisfaction with community and with</td>
<td>Binary logit model</td>
<td>Subjective satisfaction is a strong predictor of thoughts about moving. Thoughts about moving is a good predictor of actual mobility.</td>
<td>This study provides one basis for future advances in the application of stress models, particularly through the integration of structural and stress factors into joint models.</td>
</tr>
<tr>
<td>Boehm and Ihlafeldt (1986)</td>
<td>Journal of Regional Science,26,411-424</td>
<td>Neighborhood Housing Services Project (1978-1980)</td>
<td>Whether households move between times t-1 and t</td>
<td>Household's perception of neighborhood quality when it moved into the dwelling unit on a five point scale</td>
<td>Binary logit model</td>
<td>In comparison with other measured factors, the level of neighborhood quality and changes in neighborhood quality are found to be strong predictors for both homeowners and renters.</td>
<td>The evidence obtained from a model which measures disequilibrium in the consumption of housing services owns greater precision than in previous analyses.</td>
</tr>
<tr>
<td>Shefer (1986)</td>
<td>Journal of Urban Economics,8,107-124</td>
<td>Two distressed neighborhood in Tel Aviv, Israel</td>
<td>NA</td>
<td>N/A</td>
<td>Tabulation method</td>
<td>For the moving-out group, quality of housing takes preference over quantity. Satisfaction with the dwelling is significantly associated with the extent of search for as well as with the relative size of the new dwellings.</td>
<td>There is evidence of differences in mobility behavior among demographic groups. The analyses in this study are more descriptive.</td>
</tr>
<tr>
<td>Zom (1988)</td>
<td>Journal of Urban Economics,34,113-128</td>
<td>A housing survey conducted by the Korean Research Institute for Human Settlement (1982)</td>
<td>Households' joint tenure choice and migration decision</td>
<td>Household assets, permanent income and moving costs</td>
<td>Multinomial logit model</td>
<td>Korean households behave in a manner similar to that in the United States.</td>
<td>It suggests that the basic economic motivations underlying households' joint tenure choice and moving decision are invariant across counties.</td>
</tr>
<tr>
<td>Boehm et al. (1989)</td>
<td>Review of Economics and Statistics,73,59-68</td>
<td>PSID (1968-1978)</td>
<td>Households' joint decision of future mobility and tenure choice</td>
<td>Permanent income and the cost of owning relative to that of renting</td>
<td>Multinomial logit model</td>
<td>Households' intra-urban mobility and migration decisions are motivated by different factors.</td>
<td>An important implication is that by separating intra-urban mobility and migration decisions for the purpose of estimation, each equation can be specified more correctly.</td>
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<tr>
<td>Baruk et al. (1992)</td>
<td>Journal of Urban Economics,32,233-256</td>
<td>Housing Allowance Demand Experiment in Pittsburgh and Phoenix (1973-1976)</td>
<td>Whether households move between times t-1 and t</td>
<td>Change in neighborhood amenities</td>
<td>Maximum score estimates</td>
<td>Low-income residents highly value remaining in their dwelling.</td>
<td>The maximum score estimates provide greater precision than probit estimates, but at a cost: the estimates describe the median household, rather than average behavior for all household.</td>
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<tr>
<td>Sinai (2001)</td>
<td>Urban Studies,38,353-540</td>
<td>A household survey in Kumasi, Ghana (1996)</td>
<td>A dichotomy of movers and non-movers</td>
<td>Use of housing for income generation</td>
<td>Logistic regression</td>
<td>The decision to move or not is not only shelter-related, but is also a business decision.</td>
<td>This study adds to traditional factors the use of housing for income generation as a possible determinant of intraurban mobility.</td>
</tr>
<tr>
<td>Kan (2007)</td>
<td>Journal of Urban Economics,61,436-487</td>
<td>PSID (1980-1981)</td>
<td>Whether households move between times t-1 and t</td>
<td>Local social capital surrogated by the availability of the assistance offered by someone living nearby when there is a serious emergency</td>
<td>Binary probit model, multinomial probit model</td>
<td>Possession of local social capital deters households from moving, while its effect on short-distance mobility is insubstantial.</td>
<td>The local social capital measures used in this study seem crude and the effects of these variables no mobility may instead stem from one's psychological attachment to his neighborhood.</td>
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## APPENDIX 2

### Table 2: Empirical evidence about mobility constraints

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<th>Papers</th>
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<td>Graves</td>
<td>(1983)</td>
<td>PSID (1977-1978)</td>
<td>Residence duration</td>
<td>Logistic regression model</td>
<td>Large number of movers and non-movers significantly differ in the probability of moving</td>
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### APPENDIX 3

#### Table 3: Empirical evidence about mobility psychology

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<th>Papers</th>
<th>Citation</th>
<th>Data</th>
<th>Dependent variables</th>
<th>Key independent variables</th>
<th>Methodology</th>
<th>Main Findings</th>
<th>Remarks or limitations</th>
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<tr>
<td>Andrulis</td>
<td>Journal of Urban Economics, 11, 85-97</td>
<td>PSID (1971-1972)</td>
<td>Households' joint decision of residential and job mobility</td>
<td>Degree of risk aversion, potential job change and desire for mobility</td>
<td>Multinomial logit model</td>
<td>The costs of uncertainty are quantitatively different from those of transactions costs and changes in commuting costs. Risk aversion decreases the odds of changing residence or workplace relative to no change.</td>
<td>The author firstly derives analytically the implications of uncertainty on a household's residential mobility behavior. However, the definition of risk aversion seems arbitrary.</td>
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<td>Kan</td>
<td>Journal of Urban Economics, 45, 72-96</td>
<td>PSID (1979-1987)</td>
<td>Households' mobility expectation and the probabilities of moving conditional on expecting to move and on expecting not to move</td>
<td>Changes in household socioeconomic characteristics</td>
<td>Random effects conditional probit models</td>
<td>Household's mobility decision is likely to be interrupted by unanticipated changes.</td>
<td>As this paper demonstrates, to understand households' mobility decisions, it is not sufficient to focus only on the actual behavior of mobility.</td>
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<td>Kan</td>
<td>Journal of Urban Economics, 52, 501-523</td>
<td>PSID (1971-1992)</td>
<td>Whether households move between times t-1 and t; whether households expect to move in year t</td>
<td>Job changes</td>
<td>Binary probit model</td>
<td>Household's likelihood for changing jobs in the future dampens their propensity to move, but encourages the formation of their mobility residential mobility in a dynamic context. expectation.</td>
<td>This paper is among the first to consider the relationship between job changes and households' mobility decisions. It is not sufficient to focus only on the actual behavior of mobility.</td>
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<td>Kan</td>
<td>Journal of Urban Economics, 54, 566-586</td>
<td>PSID (1991-1995)</td>
<td>Households' joint decision of residential and job mobility</td>
<td>Degree of risk aversion</td>
<td>Random effects multinomial probit model</td>
<td>Households with different degree of risk aversion have differential tendencies to undergo joint residential moves and job changes.</td>
<td>This paper departs from the literature by allowing a household's degree of risk aversion to be a confounding factor in its residential and job mobility joint decisions.</td>
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<tr>
<td>Engelhardt</td>
<td>Journal of Urban Economics, 53, 171-195</td>
<td>NLSY79 (1985-1996)</td>
<td>Whether households move between times t-1 and t; probability of moving in period t conditional on having not yet moved</td>
<td>LTV, nominal loss, dummy loss variable and interactions of the loss variable with the LTV spline</td>
<td>Linear probability model and hazard model</td>
<td>Household mobility is significantly influenced by nominal loss aversion.</td>
<td>This study focuses only on young households.</td>
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</tbody>
</table>
NOTES

1. Edin and Englund (1991) find that a move is associated with, on average, a 40% change in housing consumption, as measured by the market value of a house.

2. This study uses the rehabilitation data on alternations and replacements. Alternations alter the decor or add a new element to the housing unit without the use of additions. Existing housing capital can also be replaced.

3. Unfortunately, previous studies have often eliminated the investment aspect by examining only low-income renters who are unlikely to be able to consider purchasing a home, allowing the researchers to focus solely on the consumption aspect. Some empirical papers lend support to the idea that housing considerations affect portfolio choice (e.g., Fratantoni, 1998; Yamashita, 2003).

4. In his paper, Fu omits other risky assets from consideration and excludes the possibility of portfolio adjustment in response to uncertainty.

5. The notion that households are quite active in adjusting their housing investment in response to changes in market conditions has been empirically verified by Ioannides and Kan (1996).

6. Robst et al. (1999) empirically reexamine this relationship. Results indicate that income uncertainty exert an import influence on households' tenure decision, with uncertainty reducing the likelihood of individuals owning homes at a point in time.

7. Since most borrowers are unable to borrow perfectly against future income, ARMs allow them to adjust more precisely at the margin of the housing and nonhousing prices that must be paid.

8. Empirically, several studies identify the sample selection bias associated with differences in the ease of selling a property over time (e.g., Haurin and Hendershott, 1991, Clapp and Giaccotto, 1992, Steel and Goy, 1997, Munneke and Slade 2001).

9. Engelhardt employs data on young homeowners form the National Longitudinal Survey of Youth. It focuses on young households who are most mobile and the most leveraged, hence the most likely to be equity constrained when house price decline.

10. Weinberg et al. (1981) find that cost variables consistently explain more variation in search and mobility than do benefit variables, reiterating a finding of Goodman (1976); Bartik et al. (1992) estimate that a typical low-income renter is willing to pay 10% of his income to avoid being forced out of his current dwelling; Nordvik (2001) note that stamp duty nearly accounting for 75% percent of the monetary moving costs in Norway is an important part of the monetary moving costs for owner-occupier.

11. Psychic cost is related either to the agony of the move itself or to the agony of settling in a new destination.

12. Haurin and Gill look at the certainty of income, specifically whether the spouses of military personnel received income. They assume that spouses’ earnings are more uncertain than military husbands’ earnings.

13. Some recent studies have questioned the existence of loss aversion (e.g., Ert and Erev 2008). Alternatively, Gal (2006) argues that the phenomena previously attributed to loss aversion are more parsimoniously explained by inertia than by a loss/gain asymmetry.

14. See Quigley and Weinberg (1977) for a comparison of this literature.

15. Rose (1979) argues that families with new heads should be excluded because of the difficulty in obtaining reliable permanent income estimates. Additionally, in some studies, age of the household head has always been entered in quadratic fashion in order to capture nonlinearities that potentially occur over the life-cycle (e.g., Henderson and Ioannides, 1989). While others prefer age to be represented as a logarithm because homeownership rapidly increases in frequency in the early decades of adulthood and reaches an almost stationary plateau for ages over 40 (e.g., Rossi and Weber, 1996).

16. He show that ethnic consideration in Karachi have considerable influence on the mobility behavior of the migrant as it has on their choice of location, with as many as 75% of migrant households moving between
neighborhoods predominantly comprising households of the same ethnic background.

17. In computing households’ permanent income, almost all of the previous studies assume that households make no bequests.

18. Livitan’s method is derived from the errors-in-variables model proposed by Friedman (1957) in specifying the permanent income hypothesis.

19. Total wealth is estimated by using earned and unearned income streams and net housing equity, as well as fixed effects. The components of wealth are then instrumented.

20. MaCurdy (1981) notes that permanent income is a valid summary measure of future income streams only if work hours are fixed or wages are constant.

21. The earning capability variable derived from this approach different from permanent income because estimates of income depend on wages and labor supply behavior while full earnings depend only on the present value of future wage rates.

22. Only looking at recent movers is also a waste of information. In particular, given the rather low mobility in some countries, only looking as those who moved recently leads to a large reduction of the typical sample. For a review, see Edin and Englund (1991).

23. While many authors claim that their results are robust to parametric self-selection corrections, these techniques require assumptions about the selection equation that are difficult to defend.

24. This is the case unless changes in household characteristics are perfectly forecast by current characteristics.

25. For example, some household characteristics such as age, marital change and birth of a child tend to have similar effects as in the West, in general the housing adjustment thesis is less applicable in Chinese cities (Li, 2004; Wu, 2004; Huang and Deng, 2006). Another example is that the use of housing for income generation is a way of life for many households in urban centers in developing countries (Sinai, 2001). This suggests that, for these households, the decision to move or not is not only shelter-related, but is also a business decision.
REFERENCES


Journal of Urban Economics, 8, 330-349.

Urban Studies, 38, 535-540.


Weinberg, D. 1979. The Determinants of Intra-urban Household Mobility. Regional Science and Urban Economics,


