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Transportation credit mortgages, Spatial sorting and housing supply: Who benefits?

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16. Abstract

Transportation credit mortgage (TCM) programs are intended to reduce auto use, decrease sprawl, and increase housing options for low- and moderate-income households. The centerpiece of such programs is a credit to income for expected savings on auto use for households who purchase a home with good transit access and/or high population density. It is hoped, first, that a higher share of those in target neighborhoods will consist of households who use transit and walk; second, that there will be more housing provided in target neighborhoods. But both outcomes depend on conditions that may not hold. In markets where housing costs are high, and where TCMs have often been targeted, they are particularly unlikely to work as intended. Such markets are often characterized by high demand due to growth pressures and significant policy constraints on new development. Given those conditions it is possible that existing owners of land in TCM-targeted areas will receive a one-time windfall in the form of a higher sales price for their homes; low- and moderate-income households will pay more for housing with little or no benefit to show for it; and the share of travel via alternative modes will remain stable or decline. The TCM may not have these unintended negative effects in high-turnover, low-growth markets with a high elasticity of housing supply—but in such markets, paradoxically, the TCM is less likely to make a difference in housing bids because fewer households are likely to be constrained by standard lending criteria.

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1. Introduction

Transportation credit mortgage (TCM) programs allow households to take out larger mortgages for homes which are in areas with good transit access and high population density. The National Resources Defense Council (NRDC) claims that households who live near public transit and do not own and use cars can save up to $400 per month (Bollier 1998).[1] Households applying under a TCM program for loans in neighborhoods with good transit and walking access are given credit for having lower anticipated transportation costs, either in the form of a higher ratio of loan to income, or a direct credit to income.

TCM programs have been in existence since July, 1999, and all to date appear to have been underwritten by the Federal National Mortgage Association (Fannie Mae). [2] The original program is the "location efficient mortgage" (LEM), initiated in 1995 by Chicago's Center for Neighborhood Technology, the Natural Resources Defense Council and the Surface Transportation Policy Project. The LEM has been or is currently being offered in Chicago, Los Angeles, San Francisco, and Seattle.[3] Although as of 2002 only a few dozen loans had been made (Krizek 2003: 658), the programs have been significantly expanded since that time. As of July, 2005, a second program, Fannie Mae's "smart commute" mortgage, was available in 39 cities and more than 50 counties in the United States,[4] including Minneapolis/St-Paul[5], Atlanta[6], Baltimore[7], Washington DC, Sacramento, Denver, St. Louis, and the states of Delaware[8] and New Jersey. These localities often

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[1] Others have cited the NRDC as reporting savings of $750 per month; see http://www.walkablestreets.com/lem.htm, cited Aug 23.
[2] Fannie Mae news release of June 10 1999 (http://www.fanniemae.com/news/pressreleases/0342.html).
[3] As reported on the Institute for Location Efficiency website: www.locationefficiency.com. Cited August 2006.
[4] Fannie Mae 2005 "Smart Commute County/City Locations." Located at http://www.efanniemae.com/sf/mortgageproducts/pdf/sccitycountylocations.pdf. July.
[5] http://www.metrocouncil.org/housing/smart_commute.htm
[6] http://www.fanniemae.com/newsreleases/2004/2927.jhtml?p=Media&s=News+Releases
[7] http://www.commuterchoicemaryland.com/waystosave/smart_commute_mortgage.cfm
[8] http://www.apta.com/passenger_transport/thisweek/030421-3.cfm

offer additional subsidies from other funding sources, such as local transit agencies. Typical programs relax the conventional underwriting ratio, allow small down payments (e.g., 3% of value, or flat down payments of as low as $500), and (sometimes) cap the maximum mortgage amount (see, for example, Institute for Location Efficiency 2002). Some programs also provide free transit passes for the household for up to a year.

The credit to income, or relaxed loan-to-income ratio, has different values for different eligible locations varying primarily as a function of transit access and population density. For the original TCM, the "location efficient mortage," the credit was some percentage of an estimate of transportation savings based on empirical research by Holtzclaw et al (Holtzclaw et al. 2002) carried out using data from Los Angeles, Chicago and the San Francisco Bay Area.[9] This study is largely an extension of a previous one of San Francisco (Holtzclaw 1991). The authors regressed average auto ownership and vehicle miles traveled (measured at the zip code level) as functions of population density, public transit availability, income, and other variables (measured at the transportation analysis zone level). Coefficients from this model were used to calculate cost savings as a function of population density and transit access of the zone in which the house is being purchased. Under some programs, the credit to income is capped at $200 per month for individual applicants and $250 per month for joint applicants.

The immediate effect of the TCM's availability is that households who qualify for the loan can make higher offers for houses in neighborhoods with high population density and transit access. Critically, it appears that people of all income types and housing preferences qualify. However, there is sometimes a limit to the size of the mortgage that can be financed; for example, the cap in Chicago is about $300,000.

[9] The credit may be calculated in a similar way for the "smart commute mortgage," but it is not clear from available sources.

2. The multiple purposes of the TCM

> "[Transportation credit mortgages are] a way to kill many birds with one stone: encourage public transit use and compact development; increase homeownership opportunities among low- and moderate-income families; support local neighborhood businesses; and discourage excessive auto use and suburban sprawl... Financial institutions also like [TCMs] because they fit community-lending criteria and help them break into low- and moderate-income markets." From *Shelterforce Online*, Issue #103, January/February 1999.

Proponents of the transportation credit mortgage speak of many goals (e.g., Danielsen, Lang, and Fulton 1999; Krizek 2003) but are somewhat vague about how the goals relate to the TCM—similar to the "smart growth" and "transit-oriented development" movements to which the TCM is linked. First, the TCM is intended to reduce auto use—although as I show later, the mechanism by which this is intended to occur is unclear. Second, it is supposed to increase opportunities for homeownership among low- and moderate-income households in two ways: by making such households more competitive for existing units, and by stimulating more housing development near transit. Third, it is intended to reduce urban sprawl—again, by stimulating infill housing development.

The ostensible market failure being corrected by the TCM is that lenders have conventionally not recognized the savings that location-efficient housing theoretically makes possible. But households presumably already take such savings into account in deciding the mortgage they can afford.[10] Thus the market failure is about the unknown margin of households who want to bid more than they are allowed under standard lending formulae.

3. Previous critiques

Scholars have expressed two main main grounds for skepticism about whether the TCM will work as intended.

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[10] While tradeoffs between accessibility (i.e., transportation costs) and housing price may not always be conscious in individual decision making processes, they are clearly reflected in empirical studies of housing prices that find proximity to desirable destinations being capitalized into the cost of housing.

First, the empirical models upon which estimated transportation savings are based employ aggregate data; use model forms which are non-ideal for the dependent variables; and may essentially ignore the phenomenon of residential self-selection to the extent that they assume population density and transit access "cause" people to use autos at a lower rate (see, e.g., Boarnet and Crane 2001). Such models may also omit important explanatory factors correlated with population density and transit access and are themselves directly accountable for lower rates of auto use, such as scarce parking, congested conditions for autos, and pedestrian-oriented retail development (Chatman 2005). Failing to control for these correlates is problematic. Though correlations may be strong in cross-sectional data for the three cities upon which the values are based, they may not be strong for other locations and, in particular, for new development. In fact, households living in new development near transit can have auto usage rates *higher* than that of surrounding areas (Chatman 2006).

Second, residents of such areas may not have lower default rates. This implies the program may increase defaults and not be market-supportable (Blackman and Krupnick 2001). Other research has shown a major foreclosure problem in some low-income communities due to the greater availability of relaxed lending terms, subprime loans, and other programs that allow low-income households to take on more debt than they can manage (e.g., Newman and Wyly 2004).

Assuming that the models of transportation cost savings used for the TCM are correct, and that default rates will not go up, the TCM can nevertheless be critiqued based on its central premises.

4. The goals of the TCM, re-articulated

The goals of the TCM can be re-articulated as consisting of benefits to society at large, to low- and moderate-income households, and to transit-preferring households.

The ostensible benefits to society at large include lower congestion and auto pollution due to a reduction in auto use; and reduction in land consumption, which may have external benefits consisting of better average proximity to "open space," lower amounts of urban runoff, and the like.[11]

The ostensible benefit to low-income households consists of their being able to successfully purchase housing in desired locations, rather than to rent or buy in places that are second choices. They may pay more for that housing, but the presumption is that if they do so it is welfare-improving.

Finally, the presumed benefit to transit-preferring households is essentially the same as that to low-income households. It consists of transit-preferring households being allowed to purchase (at a higher cost) housing near transit rather than to buy or rent housing farther away from transit that is less convenient for them. (We ignore for the time being the question of whether low-income and transit-preferring households are largely the same households.)

Previous critiques of the TCM do not address what appear to be two of its central premises. The first is that the TCM will increase residential sorting, according to travel preferences and economic determinants of travel choices such as income and —closely related—auto ownership. That is, households who want or need to use transit, or to walk, will in the long run make up a greater share of households in places with good walking or transit access.

The second premise is that by increasing demand for housing in dense, transit-proximate developments, the TCM will stimulate the supply of such housing. If the TCM increases demand for TCM-eligible housing, developers may respond by bringing more (and, definitionally, higher-

[11] I do not address here whether these ostensible social benefits are a complete accounting of benefits to society. For example, in some localities there may be subsidies to transit high enough that there are net social costs when transit ridership increases. The focus in this paper is evaluating the likelihood of intended changes to aggregate travel patterns and (to a lesser extent) land consumption.

priced) housing units on the market in such areas that would not have otherwise have been developed—via new construction, refurbishment, subdivision of existing units, or conversion of rental to ownership stock. If in fact the TCM does increase residential sorting, then simultaneously increasing the supply of location-efficient housing would be likely to decrease auto use as intended.

Aside from these two main premises upon which the TCM is based, there is he important question of whether low- and moderate-income households and transit-preferring households are likely to benefit from the TCM, a question that has not been addressed by previous research. Liberalization of lending terms since 1990 is one reason for the increasing rate of homeownership among low-income and minority populations (Listokin et al. 2002). The TCM represents another wrinkle in this innovation process.

5. Could the TCM work as intended?

Under the following conditions it seems reasonable to expect that the TCM will result in increased transit ridership, lower auto use and more walking by changing the demand for TCM-eligible housing with consequent changes in the spatial sorting of households.

1. If they were allowed to so, a significant number of low- and moderate-income households would make bids exceeding conventional lending ratios for homes in places with high population density and transit access.

2. People who prefer traveling by transit and on foot are of lower income than those who prefer traveling by auto.

3. Low-income, transit-preferring households unconstrained by conventional lending criteria would successfully outbid higher-income households with auto preferences.

The first condition is the basis for the TCM program. The fact that households are *able* to bid more for TCM-eligible housing has no meaning unless they *want* to bid more but are constrained from doing so.[12] Low- and moderate-income households are perhaps the most likely to find existing

[12] Another possibility is that the TCM program functions as an awareness-raising campaign for the purported benefits of living near transit, and increases people's willingness to make higher bids near transit.

lending constraints binding, but it seems less likely that they will find them binding in low-demand markets with high elasticity of housing supply—for example, low-growth areas without development constraints.

The second condition is similarly critical. If low-income households do not prefer to use transit and walk at a substantially higher rate than other households, then increasing the likelihood of their occupying transit-proximate housing will have little effect on travel patterns.

If the first two conditions are correct for a given housing market or submarket, the TCM will likely result in lower income, alternative-mode-preferring households making higher bids on TCM-eligible housing. The final condition is that some bids will be successful—that is, some of those households will successfully outbid higher-income, auto-preferring households. All three conditions are necessary for residential sorting to occur as intended. The time frame over which this will occur is, of course, an empirical question of turnover rates, induced early selling, and other concurrent neighborhood change processes.

Turning to the supply side, the TCM will only result in more housing supply if some of the conditions for sorting are in place—in particular, higher bids being made on TCM-eligible housing. This greater demand may stimulate more housing being brought online, particularly under the following conditions:

4. Government policies, local plans, and natural circumstances do not constrain housing production increases in TCM-targeted areas
5. Such constraints are also relatively unimportant elsewhere in the housing market of which the TCM-targeted areas are a part.

In order for housing supply to increase in TCM-targeted areas in response to greater demand, of course, there must be no significant policy constraints on housing production in targeted areas. There must also be no significant natural or historical constraints on development such as low land availability or high demolition costs for infill.

Even if policy or other constraints on housing production are not binding in TCM-targeted areas, they might be binding elsewhere in the local housing market. If so, sorting by transit preferences and income may not occur even while housing prices increase and the supply of TCM-eligible housing increases.

If all five conditions hold, leading to residential sorting concurrent with an increase in housing supply in TCM-targeted areas, it seems reasonable to expect that the TCM will lead to increased transit ridership, lower auto use and more walking, and possibly even reduced land consumption at the urban fringe. Under these conditions the TCM will also benefit low- and moderate-income, transit-preferring households to some extent, assuming demand by these groups is elastic and therefore sellers of TCM-eligible properties do not confiscate all consumer surplus (i.e., winning bids do not equal the maximum willingness-to-pay of buyers).

6. Will the TCM work as intended?

Whether the TCM will work as intended depends on the extent to which these conditions hold. There are three main questions addressed here, the first two of which address the ostensible social benefits. Will sorting by transit preferences happen as intended? At the same time, will housing production increase in TCM-targeted areas? Finally, will low-and moderate-income households benefit? In general, these are empirical questions that will vary from market to market.

6.1. Will sorting happen?

The anticipated sorting process that the TCM is expected to cause is illustrated with a simple bid-rent curve with two groups, poor and moderate income households and rich households, in Figure 1. Demand by poor and moderate income households before and after the introduction of the TCM is denoted by $\mathbf{d_{pm1}}$ and $\mathbf{d_{pm2}}$ in the figure. Demand by remaining (rich) households is denoted by $\mathbf{d_{r1,2}}$ (demand by rich households is presumed *not* to change due to the introduction of the TCM).

The first necessary condition for sorting by transit preferences to occur is that current mortgage lending terms currently constrain a significant number of low-and moderate-income households from bidding as high as they would like on TCM-eligible housing. If so, the TCM creates an opening for those households to increase their bids. In markets where buyers compete intensely for housing due to high population growth or because there are significant constraints on housing production, it seems likely that lending constraints are binding. But it remains an empirical question. Housing costs have increased as a percentage of income in the U.S., and residents of poor U.S. cities generally have the highest percentage of mortgage holders spending more than 30 percent of their income on housing.[13] By how much they are binding—that is, what are the bids that would result if such constraints were removed entirely—is also an important question (see below).[14] But in certain markets, such as slow housing markets with low growth, where the current lending terms do not constrain bids, the TCM program is unlikely to have much value.[15]

The second condition for sorting by transit preferences to occur is that those same low- and moderate-income households constrained by existing lending criteria also use alternative modes more frequently and use autos less. It is well established that household income is highly positively correlated with auto ownership and use, and negatively correlated with transit use and walking (e.g., Schimek 1996; Pucher, Evans, and Wegner 1998; Giuliano 2003; Giuliano and Narayan 2003; Pucher and Renne 2003). But the relationship is not determinative or even strongly predictive. For poor households, like all households, by far the most frequent travel mode for work and non-work purposes is the personal vehicle. In 2001 about 76 percent of all trips by households earning less than $20,000 per year were made via auto, while among remaining households, income is not

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[13] "Across Nation, Housing Costs Rise as Burden." Janny Scott and Randal C. Archibald. *The New York Times*, October 3, 2006.

[14] I ignore the possibility that lending constraints are necessary to impose rationality on bidders who would otherwise incur debts they cannot afford.

[15] There are social welfare implications of allowing higher bids—I return to this issue in a later section.

highly correlated with the share of trips by auto. Auto mode split for trips of all kinds is between about 87 and 88 percent for all income classes above $20,000 per year (Pucher and Renne 2003). As of 1990, even households who did not own any cars at all (and who typically lived in central urban locations) made twice as many auto trips as transit trips, even though they typically had relatively good transit access (Crepeau and Lave 1996). In 2001, a very similar pattern held for urban households without cars (Pucher and Renne 2003).

Stipulating the first two conditions, will low-income, transit-preferring households outbid higher-income, auto-preferring households for housing in TCM neighborhoods? This is again largely an empirical question varying by housing market. The additional purchasing power freed up by the TCM at current interest rates will vary. For a median-income household in Atlanta, GA in 2004 this amount was estimated at $12,500.[16] That is a significant amount of money in some markets, while in others it may not make the difference between a successful and unsuccessful bid by a low- or moderate-income household when bidding against higher income households. Much depends on the characteristics of the housing and neighborhood, and constraints on the market. In markets where housing is in short supply, higher-income households may continue to outbid lower-income households for high-density housing near transit.

An alternative way to approach the question of sorting is as follows. It is has historically been observed that in U.S. urban areas, the density gradient—falling-off population density as one moves away from the city center—is matched by an inverse income gradient—that is, rising income as one moves away from the city center. A similar income and density gradient is at work with respect to transit proximity, walking access, and road access, yielding a more complex gradient surface with peaks at freeway on- and off-ramps, transit stops, other areas of high transit

[16] Fannie Mae news release, January 26, 2004. Accessed at http://www.fanniemae.com/newsreleases/2004/2927.jhtml.

accessibility, and locations with good walking access. Low-income households are generally more likely to value transit access than rich people because they are more likely to depend on transit, so these rent gradients reflect an ongoing sorting process in which the heterogeneous preferences and constraints result in concentrations of auto users, transit users and walkers.

But there are two reasons why the implied sorting process is weak. First, although transit is clearly valued in the housing market, transit proximity is a relatively minor criterion for location decisions and is not strongly determinative of the final neighborhood choice, even for low-income households.[17] Housing and neighborhood choice involves optimizing over multiple criteria, including criteria that may be more salient to most households (such as school district choice); and every dimension cannot be simultaneously optimized, unlike for discrete, unbundled goods. This means that more liberal mortgage terms in TCM neighborhoods may not change spatial sorting by travel preferences very much. TCMs may instead allow higher bids in TCM-targeted areas by low- and moderate-income households irrespective of their likelihood to own and use autos.

Second, gentrification may occur in urban core areas that are near transit stops for historical reasons, as part of so-called "transit-oriented developments." New development or significant refurbishment near rail stops may be attractive to both non-transit-using and transit-using households and, depending on the relative time and money costs of parking and driving in such neighborhoods, may dampen the anticipated sorting process.

6.2. Will more transit-proximate dense housing be developed?

Both the sorting process and the market development process upon which the success of the TCM depends may be hindered by policies limiting the development of housing generally and

[17] A recent household survey, with an oversample of transit-proximate areas, in San Diego and the San Francisco Bay Area asked questions about the criteria considered in the most recent residential move. About 14 percent of the sample stated that they considered transit for any reason in the most recent move; those households were roughly 25 percent more likely to have succeeded in finding a house within 1/2 mile of a rail station than those who did not consider transit access at all (Chatman 2005).

high-density housing specifically. Constraints on housing make supply more inelastic. The consequences are illustrated in Figure 2, in which the new demand curve after the introduction of the TCM (denoted by $\mathbf{d_{TCM}}$) results in relatively little additional housing and a higher cost of housing when the supply is constrained (denoted by $\mathbf{supply_i}$) than when it is not so constrained (denoted by $\mathbf{supply_e}$). Two constraint scenarios are worth discussing.

In the first scenario, there are policies constraining housing production throughout the larger housing market in which the TCM has been introduced. These policies include strict off-street parking requirements (Shoup 2005), minimum lot sizes, maximum floor-to-area ratios, condominium conversion laws, and restrictions on the number of allowed housing units per developed acre. Such policies either drive up the cost of developing housing or directly regulate the quantity of production. In addition to formal zoning codes and plans, local opposition to dense housing development is often expressed in ad hoc policy making and building permit decisions (Fischel 1985). In the first scenario, the TCM program is obviously likely to fail to stimulate the development of denser housing in TCM-targeted areas because local governments simply do not allow intensification. Paradoxically, the TCM program may be particularly likely to be touted as a valuable tool in places where there are affordable housing problems—but housing costs in many cities are likely increased by such policies (Fischel 1985; Glaeser and Gyourko 2002; Levine, Inam, and Torng 2005).[18]

In the second scenario, policy constraints are generally present everywhere but are relaxed in TCM-targeted neighborhoods as part of a "smart growth" or "transit-oriented development" policy program. Crucially, in this scenario housing production in targeted areas may indeed increase, but the sorting process will be constrained, possibly significantly so. TCM-targeted areas—places with relatively high population density and good access to transit—typically may

[18] Glaeser and Gyourko show evidence that only coastal cities are clear culprits.

make up a very small portion of total potential development in the housing market.[19] In this case, development may be stimulated in TCM-targeted areas, and end up purchased by a higher-income, auto-preferring buyers, without an aggregate reduction in auto use. Benefits for low- and moderate-income households may be limited to any price reductions due to an increase in the overall stock of housing.

6.3. How will ownership benefits and costs be distributed?

In high-demand areas without policy or other constraints on housing production, households are more likely to bid to the maximum of their ability to pay for a mortgage, and the TCM allows people to make higher bids on some housing. Buyers benefit to the extent that they make higher bids, succeed in purchasing houses in such areas that they formerly would have lost, and eventually purchase the houses at a price lower than their value of the house. Sellers will of course benefit, but if demand is elastic much of the benefit could be captured by buyers .

In high demand markets with constraints on housing production, making more liberal mortgage terms available will result in even higher bids due to a constrained number of TCM-area housing units, expressed in Figure 2 as an inelastic housing supply curve ("$supply_i$"). This will result in more of the benefit being captured by land owners than if supply is somewhat elastic ("supplye" in Figure 2).

In either case, if the program is made permanently available, there will be a one-time windfall for landowners, assuming that no future intensification of use occurs, and the cost of housing will be permanently raised to the new level.

In lower-demand markets, households who prefer to travel via transit and on foot are presumably already willing to outbid other households for location-efficient homes and the TCM

[19] For example, Downs (2004) has shown using simple calculations that transit-oriented developments cannot be expected to account for much of the new development in metropolitan areas because the percentage of land near transit stations is necessarily quite low.

program is unlikely to alter these bids. However, in some low-demand markets there are likely low-income households who would like to make higher offers for TCM-area housing but are currently constrained from doing so. In such markets, lower-income households would likely benefit more than their counterparts in high-demand markets, who are likely to compete away any such benefits away by bidding against each other.

7. Conclusions

The TCM is intended to increase alternative mode use by making more liberal mortgage terms available to households who choose to live near transit. The TCM is most likely to work as intended under particular conditions. Without those conditions the TCM could fail to meet expectations and even have socially undesirable results.

Allowing people to pay more for housing will only have the intended set of impacts if people want to pay more for TCM-eligible housing—which is more likely to be the case in high-demand or low-supply housing markets. But such markets may be precisely the markets in which there are policy constraints on supply, markets where the private benefits of the program are likely to be captured primarily by current owners of property in TCM-targeted areas. And this condition is not even sufficient to ensure that the TCM results in lower auto use. The changed bidding landscape must also result in a significant turnover of the population living in location-efficient housing, and that new population must be attracted to those areas for travel accessibility rather than other reasons. The sorting process is most likely to have strong effects in combination with a significant increase in the supply of TCM-eligible housing.

In cities with significant constraints on housing production and significant development pressures (e.g., from high population growth), landowners are the only clear beneficiaries of the TCM, and there may be no change in auto use or land consumption. In regions without constraints on housing production, empirical research is needed to understand the likely impact on location

decisions of allowing people to bid more in TCM neighborhoods. The extent to which transit and walking access drive location decisions is not well understood. In general, allowing higher bids in tight housing markets will likely result in higher bids, but without necessarily increasing residential sorting. In areas of low population growth, few constraints on housing production, and relatively rapid turnover of housing stock (e.g., university towns), the TCM might be more likely to result in sorting by travel preferences as intended.

Finally, why has there been support for the TCM? It is possible that this product may help lenders or underwriters (such as Fannie Mae) to satisfy lending requirements under the CRA. Transit agencies may see the TCM as a means to boost their ridership, irrespective of any other costs or benefits. These factors are critical to examine in future research.

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9. Figures

Figure 1: Sorting by Income Before and After TCM (Time 1 and Time 2)

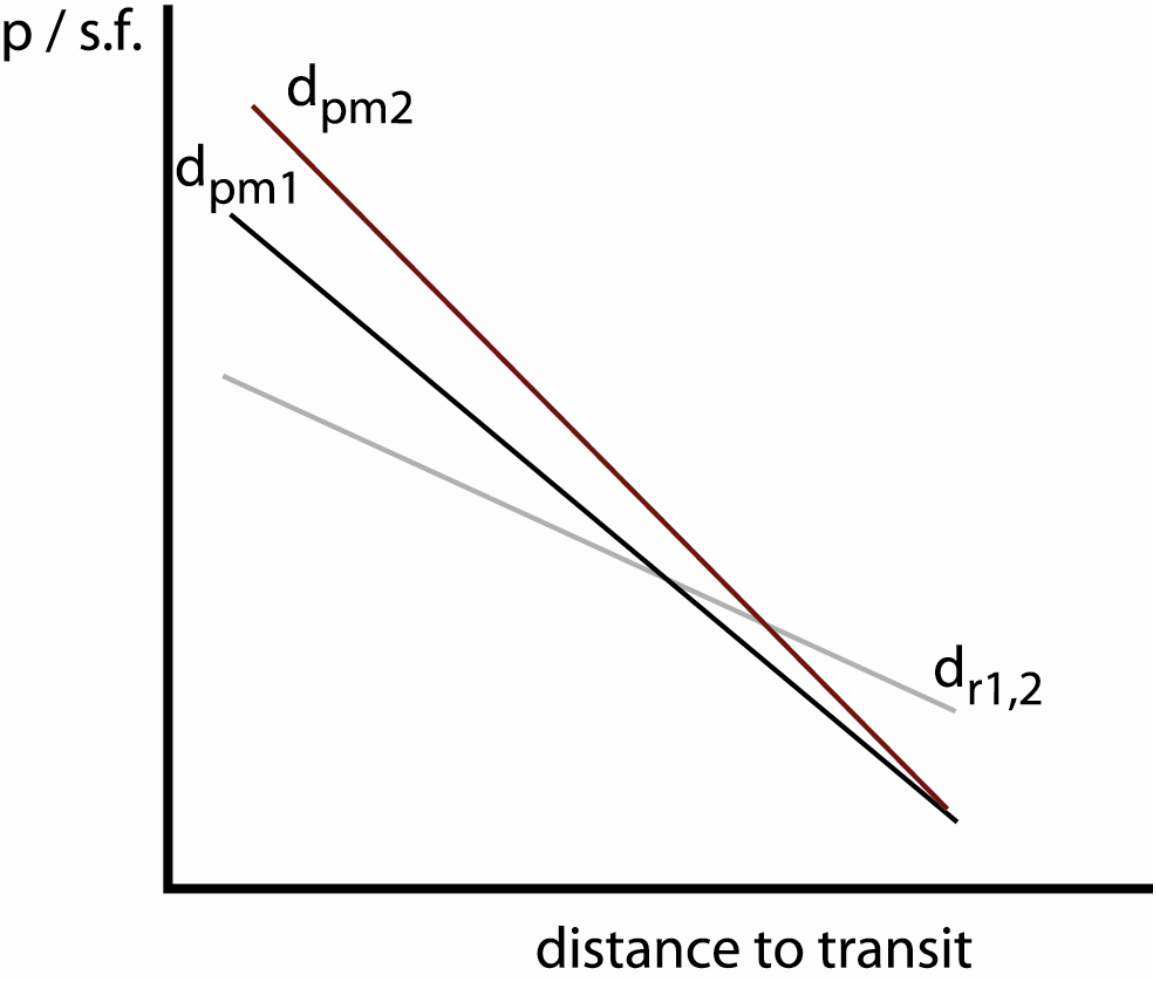

Figure 2: Demand Before and After TCM With Elastic or Inelastic Housing Supply