The Potential Economic Development Opportunities of Tren Urbano

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June 4, 1998

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1 Introduction

The construction and operation of a major transportation facility such as Tren Urbano (TU), will affect the San Juan Metropolitan Area (SJMA) and the Commonwealth of Puerto Rico in a variety of ways. The construction of an urban rail system is a very expensive investment. It has the potential to affect the economy in a positive way and become a major asset to the local and regional economy. To maximize the return from this investment we must have a good understanding of its economic impacts, and how we can influence them

2 Research Objectives

The purpose of this research is to identify and understand the potential economic impacts of TU as well as the urban characteristics, urban rail system design and operating variables, and local policies that can influence these economic impacts. Given the fact that the alignment of TU has been already decided, we are concerned with those local policies and TU's operating variables that we can control and that can have the greatest influence on TU's economic impacts.

3 Motivation

The economic role of cities is growing, and regions and countries are increasingly dependent on their economic performance. It is precisely now, when cities are becoming so important for the world economy, that traffic, congestion, and environmental degradation are limiting the economic growth of our cities and nations. It appears that we have reached a level at which the car alone cannot support the fast growth in demand for personal mobility in many cities. In this context, urban rail can be one of the elements that can and should be used to facilitate the sustainable growth of our economies.

Despite urban rail's potential economic benefits, recent U.S. experiences tend to indicate that urban rail systems are having difficulty fulfilling the expectations that are placed upon them. It is in this context that we see the need for a better understanding of the effects and the causal relationship linking the construction and operation of an urban rail system with its economic impacts; and more importantly, a better understanding of the factors that determine the success or failure of an urban rail system from an economic perspective.

4 Research Methodology

The first stage of this research was to review the literature on the economic impacts of urban rail, and on the factors that affect urban rail's success in attracting riders and development around the stations. The economic impacts of urban rail were identified, as well as the process by which they take place. The

factors that can affect the magnitude of these economic impacts were also identified. These factors can be grouped into three different categories: urban characteristics of the metropolis such as population size and densities, urban rail system design and operating variables, and local policies such as zoning regulations.

The second stage was to study the experiences of three recent U.S. rail systems. Metrorail in Miami-Dade county, BART in the San Francisco Bay area, and Metro in the Washington DC metropolitan area. Information on the three aforementioned groups of factors was gathered for each of the three metropolitan areas and their urban rail systems. In addition, phone interviews were conducted with county and municipal officials, as well as with private developers who had been exposed to the construction and operation of the system. The information collected was used to identify the factors with the highest positive and negative ridership and real estate development impacts.

The last stage was to apply these findings to the case of Tren Urbano. Information was gathered on the urban characteristics of SJMA, on the current local policies that will affect TU, and on the design of the system and its expected operating variables, as well as on the characteristics of Puerto Rico and SJMA's economy. By characterizing TU and the SJMA along the same dimensions used for the case studies (urban characteristics, urban rail system design and operating variables, and current local policies), it was possible to assess the future impact of TU as a function of these factors. Recommendations were made to help TU overcome the limitations that were identified and increase its potential economic development impacts.

5 The Economic Impacts of Urban Rail

As we can see in Figure 5-1, the construction and operation of an urban rail system has the potential to bring several types of economic benefits. The construction of the system will generate jobs and increase the skills of workers who will then be able to market their skills in other regions or countries. The attraction of riders will be beneficial for the environment, it will reduce the number of accidents, congestion and travel time cost will be lowered, and retail and entertainment activities as well as non-commercial activities will be favored. Urban rail will enhance labor market efficiency by permitting a better match between employers and workers who will be able to sell their skills to a greater number of firms. In addition, greater pedestrian activity, combined with a more attractive urban environment and lower air and noise pollution will positively affect the quality of life.

Urban rail, by fostering a reduction in the purchase and use of cars will have an import substitution effect in those areas that do not produce gas and/or vehicles. The resources will then be devoted to savings, or the purchase of other goods or services that will probably have a greater regional component.

The operation of an urban rail system, combined with the ridership it generates is likely to favor higher employment and residential densities in the station areas. This densification will be a long process

although its benefits are potentially of great importance. Densities are associated with land, infrastructure, and housing cost reductions. However, the most important benefits are related to the concentration of economic activities that is enabled by urban rail. This higher concentration of activities will reduce firm's transaction costs, making them more efficient and competitive, especially for 'advanced economic activities' in which face-to-face communications are essential.

If we want to maximize urban rail's benefits, it is important to be aware of the relationship between ridership and density levels and urban rail economic impacts. Both ridership and densification are linked, ridership and the increased accessibility of stations attract development. In turn, development generates more ridership, and it is can also attract additional development.

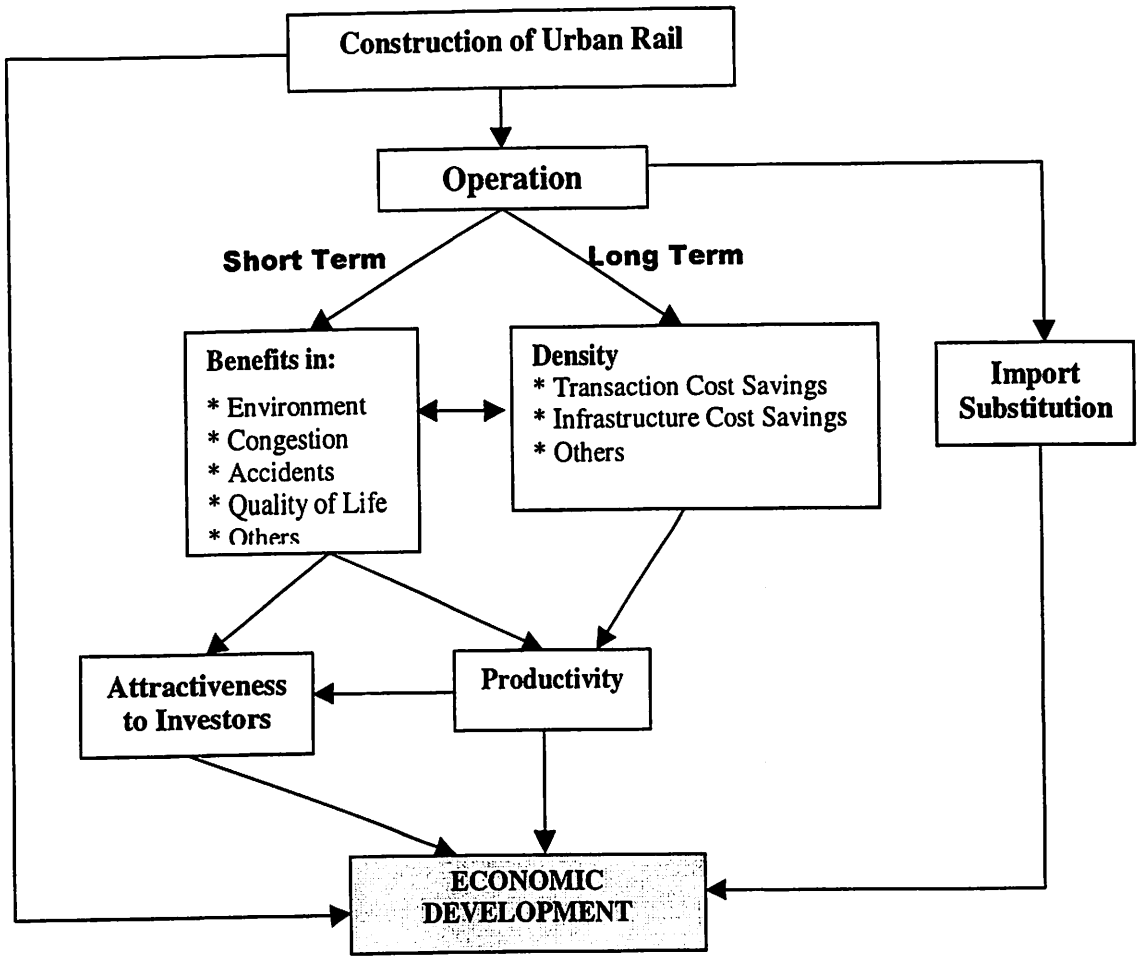
Despite the fact that some of the impacts that we have analyzed will depend more on ridership than on density levels, or vice-versa, it is not possible to draw a clear line separating them. For instance, it seems clear that the benefits of reducing congestion or decreasing the number of accidents will be directly related to urban rail's ridership. However, if urban rail helps increase density levels, it will reduce the need for automobile trips, what will decrease congestion and accidents. In the case of transaction costs, they will be reduced as a consequence of greater densities; however it is unlikely that densification would occur without high ridership levels.

If urban rail's potential benefits are realized, the entire region will achieve higher efficiency and productivity levels. These gains are likely to benefit some economic sectors more than others, but ultimately, the sum of all of these benefits will make the region a more competitive and productive economy. As we can see in Figure 5-1, this higher productivity, with the support of the quality of life improvements and other benefits enabled by urban rail, will help attract investment. Finally, this higher productivity and greater economic attractiveness, combined with construction and import substitution effects, will translate into a higher rate of economic growth.

A study using an economic model of the affected region could estimate these potential impacts. This study would allow us to have a better estimation of the economic importance of urban rail and of the magnitude of its economic impacts.

Figure 5-1

Economic Impacts of Urban Rail



6 Case Studies

6.1 Metrorail (Miami-Dade County)

Metrorail's current ridership level, averaging less than 50,000 weekday passengers, is well below expectations. There are a combination of factors that can explain the present failure of Metrorail and its low ridership level, including:

- Poor alignment of the system.
- Small network size.
- City structure that is not conducive to the use of transit services.
- Lack of dense residential and employment subcenters.
- Rail and bus frequencies are low and jitneys are not integrated with rail.
- The quality of service provided by the private car is significantly higher than that of Metrorail.

The densification and reductions in auto use that it has encouraged have been positive but it does not seem to have had a significant economic impact. If Metrorail is to bring greater economic benefits it should encourage greater densification and achieve higher ridership levels.

6.2 BART

BART, which carries 260,000 weekday passengers, has benefited downtown San Francisco, downtown Oakland, Walnut Creek, and a few other locations. The most important characteristics that have determined BART's ridership levels and its development impacts could be summarized in the following:

- The urban shape, the total population of the area, and population of the area served by BART were adequate for an urban rail system.
- Densities were not high around several of the stations but it served important centers of activity and a dense downtown, San Francisco.
- The alignment of the system is not effective. San Francisco is very well served, but it could have provided better access to other activity centers.
- The level of service is, in general, good.
- Auto access to stations is often given preference over walking or transit access. Greater attention to pedestrians and transit users may have significant impact on ridership.
- Development has been concentrated in a few sites. The lack of community interest and political will to attract development and densification to many station areas has curtailed BART's potential benefits.
- Some regulations are inadequate and there is a lack of political support.

BART has helped San Francisco increase its residential and employment densities, and several subcenters of activity have appeared or have also been strengthened. This densification seems to have had a very important impact on the financial and service sector, making of San Francisco an 'advanced city,' with a high concentration of service activities that do benefit of the greater efficiency that is enabled by BART.

Despite the apparent benefits of BART, we have to note that most of them have been limited to downtown San Francisco and a few subcenters in the Bay Area. Had there been greater development in more station areas, the ridership and densification benefits would have been larger for the region.

6.3 Metro (Washington DC)

Metro, with its 500,000 weekday users is a case of partial success. With a population that is close to the San Francisco Bay Area, it has managed to attract a greater number of patrons, and has had a more profound impact. Several of the characteristics of the urban area were conducive to the construction of urban rail including a large population and high-density urban core with low auto ownership. However, when the system opened in 1976, the suburbs of the Washington metropolitan area had already been developed at low densities and were automobile oriented. Nevertheless, Metro has been able to foster some changes in the urban landscape as the high development densities in Bethesda, and the Rosslyn-Ballston orange line corridor show.

The most important elements that have limited Metro's ridership levels and its development impacts could be summarized in the following:

- The city structure. The downtown of the District of Columbia is an important high-density destination, but there is a lack of larger activity subcenters.
- The network does not provide a good coverage of the downtown area. With the exception of Georgetown the coverage will be notably improved after the system is completed in 2001. In addition, several important subcenters of activity such as McLean and Tyson's Corner do not have direct access to Metro.
- The present socioeconomic problems in the District of Columbia have seriously reduced the attraction of living there. These are external factors to Metro, but they are curtailing Metro's capability to foster higher densities and change the urban form.

Of the three systems, Metro appears to be the one that has brought the greatest economic benefits to the region. Metro has an average weekday ridership of more than 500,000 passengers, and it has induced several important land use changes in the metropolitan area. Corridors and centers of activity have been created surrounding Metro stations, while downtown DC has increased its employment densities despite a loss of population that has been partly related to certain local problems. Therefore, it seems to us that Metro has had significant economic development impacts in the Washington DC metropolitan area.

7 Findings, Directions, and Recommendations

7.1 SJMA and TU Description

SJMA's population of 1.3 million is lower than Miami-Dade's 1.9 million residents, where the system proved unsuccessful, and far below the 3 million population in the San Francisco and Washington DC metropolitan areas. Despite the fact that residential and employment densities are sufficiently high in SJMA, the form of the city, unlike downtown San Francisco and downtown DC, is not strongly conducive to the use of transit. In addition, there is a high social value of owning a car and auto

ownership is higher in SJMA than it was in Washington DC and San Francisco when their urban rail systems began operations.

SJMA's transit systems, especially AMA's buses and públicos, do not provide effective service, and their ridership has been declining. An additional concern is the small network size of the first phase of the alignment. As the projected system is completed significant increases in TU's ridership would be expected.

Present zoning regulations do not contemplate high-density mixed-use development with lower parking requirement in the vicinity of TU stations. Finally, there is little effective coordination between the different authorities that are involved in the project or that have the power to affect it, namely the transportation agencies (TU, DTOP, and PRHTA), and the planning agencies (Puerto Rico's Planning Board, and SJMA municipalities). In addition, the SJMA has not reached the development level of San Francisco and Washington, which are 'advanced cities' where the service sector plays an important role in their economies. The present economic structure of SJMA is such that it is likely that it will not make full use of the economic development opportunities that will be brought by TU.

With these present conditions TU may have a limited capability of having an economic development impact on SJMA and Puerto Rico's economy. However, actions can be implemented to help overcome some of the limitations that we have mentioned.

Puerto Rico has a high economic dependency on manufacturing that should decrease as its economic structure approaches that of more developed nations. In addition, the important role of manufacturing is unstable, since it has been highly dependent on U.S. policies that, through the years, have favored investment in the island. The role of the service sector should increase and the natural place for the service sector growth will be SJMA, the economic heart of Puerto Rico, with 63% of the jobs in the island.

As we noted, there are several elements that will limit the amount of these economic impacts. In the following paragraphs we will discuss several actions that can be implemented to overcome some of these limitations.

7.2 Strategies and Recommendations

7.2.1 Alignment - Network Size

The first phase of the TU alignment, with only 11 miles, will provide a limited coverage of the SJMA. The following phases of the project should be soon completed, expanding its service to other major areas of activity, such as Old San Juan and Minillas.

7.2.2 SJMA's Urban Form and the Private Car

Puerto Rico's high auto-ownership and its auto-dependent urban form are likely to have a negative impact on TU's ridership. There is an interdependency between car ownership and urban development patterns; high auto-ownership encourages lower density development, and an auto-oriented urban area encourages higher auto ownership. Therefore, it will be necessary to design and implement strategies that tackle both problems simultaneously.

SJMA's Urban Form: The number of sidewalks, traffic lights, and pedestrian crossings should be increased and improved. Urban elements, such as benches, plazas, and special features that provide protection from SJMA's extreme weather conditions, should be introduced to encourage pedestrian and social activity on the streets. Increased public security will be necessary to further encourage pedestrian activity and reduce the isolation of gated 'urbanizaciones.'

Private Car Strategies: Different measures could be implemented to reduce the use of the car and improve urban rail's competitive position:

> *Gas Tax Increase:* A gas tax rise would increase the cost of driving and would make transit a more attractive alternative. A study should be done to assess the social and economic impacts of rising this tax. The economic benefits from increased TU ridership, and reductions in oil imports may turn to be more beneficial than the costs it may cause.
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> *Parking:* The cases of Miami and San Francisco have shown us how parking price and availability can affect urban rail ridership. The implementation of parking policies combining price and non-price based strategies should be studied. These parking policies should be designed to avoid decentralization with firms moving to areas where they do not have to pay for parking.
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> *Marketing:* Marketing campaigns that explain the economic and environmental advantages of using transit, combined with improvements in LOS, can help to modify attitudes toward transit among SJMA residents and subsequently increase ridership.

7.2.3 Level of Service

TU's LOS will be key to determine its ridership levels and densification effects. Ensuring high reliability of the system is also of great importance.

7.2.4 Fares

Fare levels should consider the potential economic benefits of increased ridership on SJMA's and Puerto Rico's economy. From an economic growth standpoint it may be advisable to subsidize TU fares.

7.2.5 Station Accessibility

Access to the stations is necessary to attract both riders and development. The cases of BART and Metro tell us that automobile access to the stations is necessary but insufficient to maximize the development potential of the station areas. The most successful stations in generating ridership and attracting development have been those that are highly accessible by different modes.

The size and form of the parking lots should be carefully decided. The space used for parking will affect the station environment, its pedestrian accessibility, and the same land could be devoted to alternative uses.

7.2.6 Inter-modal Integration

The 11 miles of TU's first phase define a small network, even smaller than the already limited 21 miles of Metrorail, and far smaller than the 90 miles of BART and Metro. This limitation will have to be compensated by efficient inter-modal integration with the private car and other public transportation systems. If this integration is not successfully completed, there is the risk of falling into the same situation as Metrorail.

7.2.7 Zoning

Changes in zoning regulations such as at Metrorail's Dadeland South station, can increase the development attractive of station sites and augment the potential benefits of urban rail. Also in the Washington metropolitan area changes in regulations, combined with other supportive policies, led to a change of the metropolitan structure. As a consequence of these zoning changes, several dense subcenters of activity have grown in the last two decades around Metro's stations. These changes have had positive regional economic impacts.

The case of Washington and the Bay Area support the need to introduce several changes in zoning regulations if TU is to maximize its development potential, help SJMA reduce its auto-dependency, and have a net positive economic impact on SJMA. High residential and employment densities, as well as mixed uses should be allowed and encouraged at the station areas. In addition, changes in parking requirements should be introduced so that the number of parking places that is required for office and commercial developments next to TU's stations is lowered.

7.2.8 Community Support

To avoid zoning restrictions and costly project delays caused by community opposition, special attention must be given to the communities around TU stations. The goal will be to achieve, as in Arlington county, fluid and efficient cooperation and understanding between the community, public authorities, and private developers. With all three parties pursuing a common goal, it will be possible to

reduce confrontations and expedite the identification and acceptance of good development projects, which will help attain a more attractive and productive SJMA.

7.2.9 Public-private Partnerships

TU needs to be prepared to act on a private sector schedule. Like BART and Metro, TU should have a department dedicated to bringing development to the station sites. Development at TU station areas will be affected by the policies and regulations of other public agencies. For this reason, cooperation between Departamento de Transportación y Obras Públicas de Puerto Rico, PRHTA, Puerto Rico's Planning Board, and SJMA's municipalities must be improved. Common goals, strategies, and effective procedures must be established before TU is completed. A sense of shared responsibility for TU's successes and failures should be pursued. In each of the agencies, skilled professionals and financial resources need to be devoted to identifying challenges and problems, in order to rapidly provide integrated solutions and improvements.

Private development projects can be frustrated by the lengthy and expensive process of negotiation that private developers have to go through when they are interested in publicly owned properties. Efficient and responsive collaboration with private developers and other private sector institutions must be a priority. A broad study of the present conditions of the SJMA real estate market and its future evolution must be completed. Strategies need to be established, defining the development model that each station should follow and how each station will relate to the system in a way that maximizes regional benefits.

7.2.10 Public Sector Investment

From an economic development perspective, there is an important economic potential that will fail to be exploited without an initial public investment that makes the site attractive for private developers. Stations, like Las Lomas or Sagrado Corazón, are located in areas where developers will have less incentive to develop. The intervention of the public sector may be necessary to overcome the problem and to cooperate with TU in the task of helping re-shape SJMA and reducing its auto dependence. This direct public intervention could be in the form of the provision of enhanced infrastructure and services, or it could take the form of direct involvement in the construction of public offices that could act as 'anchors' to attract private investors.

7.2.11 Additional strategies – The 'Advanced City' Model

It is the economy of 'advanced cities' like San Francisco, Washington, New York or Hong Kong, that benefits the most from urban rail systems. This is because their economies are based on the production of products that are competing on a global scale. These economies, to sustain global competitiveness, need a large labor force from which they can recruit skilled and talented professionals. Since part of the work of many of these professionals will be to participate in face-to-face meetings with clients, suppliers, and co-workers, it will be important for them to maximize their productive time. Urban rail facilitates both purposes; first it augments the size of the labor market, by increasing the distance from

which workers can commute; and second, it concentrates a large number of economic activities in a reduced area, as is the case in Manhattan in New York where meetings and face-to-face communications can occur in a fraction of time that would occur if these firms were dispersed in space. These densification benefits will be long term benefits. It will take many years until it will be possible to notice how SJMA becomes a more productive metropolitan area as it attracts investment from high value added service activities.

SJMA is far from approaching the size and importance of New York, Hong Kong, or even San Francisco. At present, SJMA lacks a strong presence of global firms or other types of firms for which reductions in transaction costs and the effective use of their highly skilled professionals can be an important source of competitiveness. However, actions can be done to bring and sustain the elements that facilitate a change in SJMA's economic structure, including:

- Skilled labor force
- Good Connections to External Markets (telecommunications, passenger, and freight)
- Attractive Environment
- Economic and Politic Stability

TU's construction could be used as an element of change. A coordinated action involving various SJMA and Puerto Rican authorities in cooperation with the private sector could be implemented in combination with the construction of TU. Several policies including changes in zoning ordinances, public investments to enhance SJMA's current urban infrastructure, investments in education, and the design and implementation of a Puerto Rican strategy to advance its economic structure could be combined with a national and international campaign, with TU as a centerpiece, showing SJMA's and Puerto Rico's commitment to change and modernization.

8 Conclusions

TU can reduce auto use and bring economic benefits, such as accidents reductions, better environment and health conditions, an improved labor market match, and especially the densification of the urban areas will promote increases in SJMA's productivity and in its investment attractiveness. However, there are several elements that can limit the potential economic impacts of TU. We have noted our concern that because of SJMA's urban characteristics and its present economic structure it may not be able to take full advantage of certain urban rail benefits such as transaction cost reductions. It is for that, that SJMA should address the problems that we have identified and adapt its economy to global economic trends if it is to be a significant regional or global player.

In the long run, as SJMA's size grows, and its economy evolves and becomes more competitive and involved in the global trade of goods and services, TU's improved accessibility and its densification

benefits will help SJMA attain greater economic benefits that will promote greater economic development in the region. Nevertheless, we have to be aware that, like in the three systems that we have studied, it will take a long time before TU's benefits are realized.

After an investment of $1.25 billion in TU, the increased economic benefits that may result from these directions may well justify their additional cost.