



BEYOND FAREBOX: FINANCING RAILWAY VIA BETTERMENT LEVIES

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1. Introduction

Cities are the economic centres of nations.

Most of the economic and social activities are accumulated in the urban area.

They need high quality and quantity of urban infrastructure to maintain their existence in a competitive World.

In the modern era the basic urban infrastructure is public transportation.

Every year cities attract more people to move in, they need certain amount of infrastructure especially transportation networks to connect them other uses in urban area.

1. Introduction

Road based transportation systems become insufficient to meet accessibility needs of the community.

Railway systems are getting more popular in many cities in the World. However railway investments by nature are extremely expensive for many countries when compared to rubber tired transportation modes.

The most important constraints to implement railway projects is the capital cost.

As a developing country Turkey is facing financial burdens for upgrading community with many projects in various sectors.

This paper aims to develop a sustainable funding model for Turkey in order to cover at least some part of the investment costs to improve railway network.

1. Introduction

The starting point of this study is the positive impact of railway corridors and stations on urban land.

Literature proves the positive impact of railway stations on urban land in their catchment area.

Their impact is highly related to the increasing accessibility.

Railways have fixed infrastructure and lead to permanent/revolutionary changes on urban land. They have direct impact on urban development pattern.

People are willing to live closer to the transportation facilities in order to reach other uses across the city. (savings in transportation costs)

2. Literature Review

There are various studies claiming that housing units with closer distances to railway stations appreciate a higher market value than others with similar characteristics but further distances.

Investments in railways are capitalized partially or fully into land prices at the same time housing market.

In this study the problem and the potential solution is combined. The problem is limited funding resources for railway investments and the potential solution is the land value increase after railway investment.

After railway projects the surrounding land value are increasing without any afford of the property owners. In this model some part of this increased land value will be collected from property owners to be used for railway financing.

2. Methodology

As it is suggested by various studies, distance to a certain transport station has a significant impact on property value.

In this study the impact of proximity to a metro station on housing price is calculated via using Hedonic Price Model.

This model allows to calculate the impact of each and every attribute of a housing unit on its price. So the distance variable is added to the price function.

A case study is selected first to calculate the impact of distance on housing market. This case study is an area where has a railway corridor in operation currently. A questionnaire survey was conducted in this area on 1st of April in 2017 with real estate agents working here. The price and all attributes related to the housing unit is gathered.

Real estate data is collected within 500 meters circular zones for every stations (5 stations). During survey 653 questionnaire is conducted.

2. Methodology

CHARACTERISTICS	
ZONE	
HOUSE CODE	
Distance to Metro station	meter (straight line distance)
Building Floor area	Meter square
Building Front	West, south, north
House price	Turkish Lira
Age of Building	years
Size of building	Meter square
Number of Rooms	Bedroom number
Number of Bathrooms	Bathroom number
Existence of Alaturka Toilette	existence
Existence of Elevator	existence

In the modeling part all gathered data is modeled via using R studio program with 653 questionnaire. The obtained coefficient for distance is reflected to a planned metro corridor.

3. Calculations

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	145653.29	10548.08	13.809	< 2e-16 ***
x1	-50.87	19.73	-2.578	0.010162 *
x2	-3870.72	241.01	-16.060	< 2e-16 ***
x3	602.13	158.64	3.796	0.000161 ***
x4	18514.33	5136.19	3.605	0.000336 ***
x5	24422.53	6656.81	3.669	0.000263 ***
x6	15114.86	4767.24	3.171	0.001592 **
x7	22238.93	4670.32	4.762	2.36e-06 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 46060 on 657 degrees of freedom

Multiple R-squared: 0.5698, Adjusted R-squared: 0.5652

F-statistic: 124.3 on 7 and 657 DF, p-value: < 2.2e-16

X1:Distance

X2:Age

X3:Size

X4:Rooms

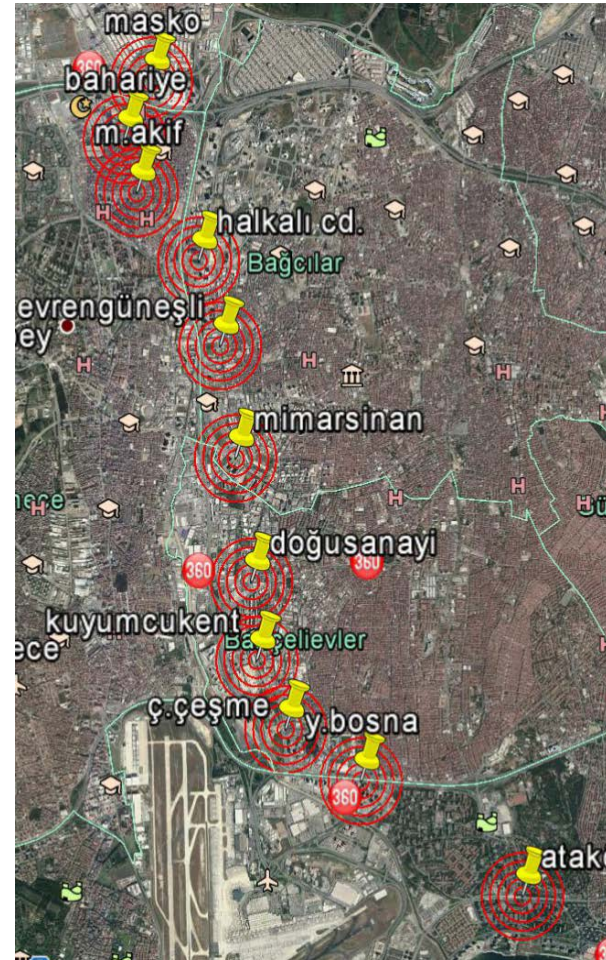
X5:Baths

X6: Alaturka

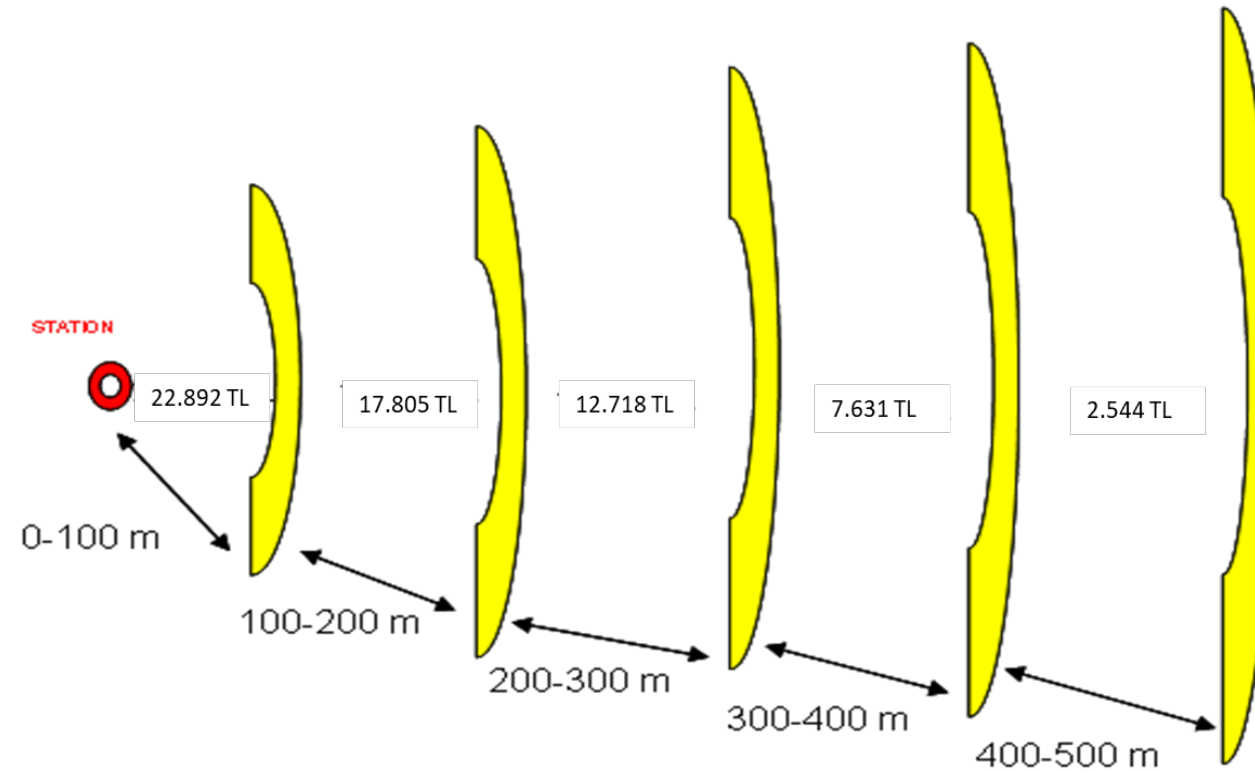
X7: Elevator

2. Methodology

Real estate data is collected around railway stations with 500 meters radius. These 500 meters are divided into 100 meter ranges and for each range value increase is calculated. The new case study is an area without a railway corridor in operation on the contrary in the construction phase.



3. Calculations



- Number of every individual housing units is obtained via questionnaire study for each station and for each zones.

These calculations show that more than 963 million TL value increase is calculated (€139 million)

5. Discussions & Recommendations

Selected metro corridor is declared in 2015, at that time project cost is estimated to be constructed with €338 million foreign barrowing. However Euro exchange rate rise from 3.42(as of September 2015) to 6,78 (as of may 2019)

Now the expected value increase is €139 million. It will of course not cover whole project but may relief the government from some part of the foreign dept.

In this study it is recommended to collect this value increase from property owners but only the 50% of it in 5 years with 5 installments. This 50% is derived from a betterment tax implementation previously in Turkey.

The decision about the buffer zone is up to the local authority in this study the recommended portion is the 1/5th of the last zone (400-500 meter zone)

Based on this assumptions total betterment levy can be collected from this corridor is approximately 481 million TL

6. Conclusions

The levy will not directly go to the national tax pool, however it will be collected in a special fund for railway financing. When needed; this money will be used only for financing railway projects in cities. Obviously this amount will not cover all capital cost, however it may relieve the government at least some part of the burden.

This study is conducted in İstanbul the most developed city in Turkey, if a financial model works in this city means it can spread all cities and can be used to expand railway network and patronage in Turkey.

Thank you
for your attention 😊

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