ERNST & YOUNG: Better Government Program 2009-10

LAND VALUE CAPTURE AS A FUNDING SOURCE FOR URBAN INVESTMENT: THE WARSAW METRO SYSTEM

Francesca Romana Medda

Marta Modelewska

UCL QASER Lab
University College London
Gower Street
London

CONTENTS

Executive Summary.

Infrastructure demand in Central and Eastern Europe has been growing rapidly, notably in the urban transport sector. Hence, accessing sufficient funding in a timely manner is crucial for the development of public transport. One innovative and increasingly accepted way to fund public transport is through Land Value Capture finance (LVC). The aim of the present report is to assess the future impacts on land value on the second metro line in the Warsaw urban area.

Poland, like many other new EU accession countries, has in the past twenty years introduced comprehensive fiscal reforms and undertaken many infrastructure investments in its cities. In this report we show how the fiscal reform and urban infrastructure investment concepts are significantly connected. Urban infrastructure investment induces increases in land values, thus it is possible to recover the capital costs of urban investment by capturing some or all of the increments in land value resultant from the investment; this may be accomplished through a fiscal mechanism such as land value finance (tax, incentives, development agreements).

Fiscal decentralisation reform, based on the subsidiarity principle, may be the pivotal point in the implementation of land value capture in Poland because the revenue generated by land value capture can be earmarked by local authorities to fund urban expenditure. After reviewing the Polish fiscal and planning system, we examine our case study. We estimate the capitalised evaluation of the extension of line 2 in Warsaw by calculating the effect of metro access on property price in two selected districts in Warsaw: Bielany with its existing metro line and Targówek, where the planned metro line 2 will pass. The capitalisation benefit of the metro access is analysed through hedonic price modeling. We show that in the Bielany district houses located within a distance of 1 km of the nearest metro station have a 6.7% higher selling price than houses in the same district but farther away. Whereas in the case of Targówek, houses located within 1 km from one of the planned stations of the line 2 extension, will achieve a price that is 7.13% higher than other houses located in other parts of the same district. In both districts the presence of the transport structure has a positive impact on house price and therefore represents a potential significant return of the transport investment.

We conclude by observing that the financial burden for the investment and maintenance and operation of the line 2 extension of the metro system can find additional dedicated resources by considering the contributions of the LVC methodology, and in this process the private sector must take a leading role in financing public transport services, particularly in Poland.

1. Introduction

In the context of Poland's sustainable economic growth, the development of high mobility standards and accessibility needs for people and goods requires the ongoing improvement of urban infrastructure systems. To meet these standards, however, considerable financial resources for investment in infrastructure, equipment and maintenance are needed. Poland, like many other new EU accession countries, has in the past ten years introduced comprehensive reforms and undertaken many infrastructure investments in its cities.

Nowadays, especially when we observe the impacts on investments caused by the recent economic crisis, transport funding is more problematic and requires developers to seek and examine alternative financial sources. Traditional funding mechanisms, particularly for transport, have become increasingly unable to cover the growing gap between operating expenses and revenue due to the complexity and diversity of transport needs. However, innovative forms of financial portfolio-building dedicated to transport investment have been evolving.

The concepts of fiscal reform and urban infrastructure investment are to a certain extent connected, given the fact that urban infrastructure investments induce an increase in land value in the area around a system improvement. It is therefore possible to recover the capital cost of the urban investment by capturing some or all of the increments in land value resultant from the investment through a fiscal mechanism such as tax, incentives, development agreements. The search for alternative and flexible methods of revenue generation and the development of the fiscal framework is a continuous process within local authorities and is certainly a paramount task in new EU member countries such as Poland. In this situation, the role of land value capture finance is crucial.

The approach of land value capture finance has a wide and comprehensive literature and numerous applications around the world (Fensham and Gleeson, 2003; Medda, 2008; Smith and Gihring, 2006; Bowes and Inlannfeldt, 2001; Andelson, 2000). Land value capture in general is a mechanism "*by which the agency responsible for the development of the urban transport infrastructure captures part of the financial benefits gained by land developers or the community at large. This benefit is reflected in an increase in the real property values, which can be regarded as a comprehensive index of all the benefits generated by the development, including improved accessibility and an increase in business opportunities*" (Tsukada and Kuranami, 1994). An idealised value capture mechanism is presented in Figure 1.

Figure 1. An idealised Value Capture finance positive feedback loop
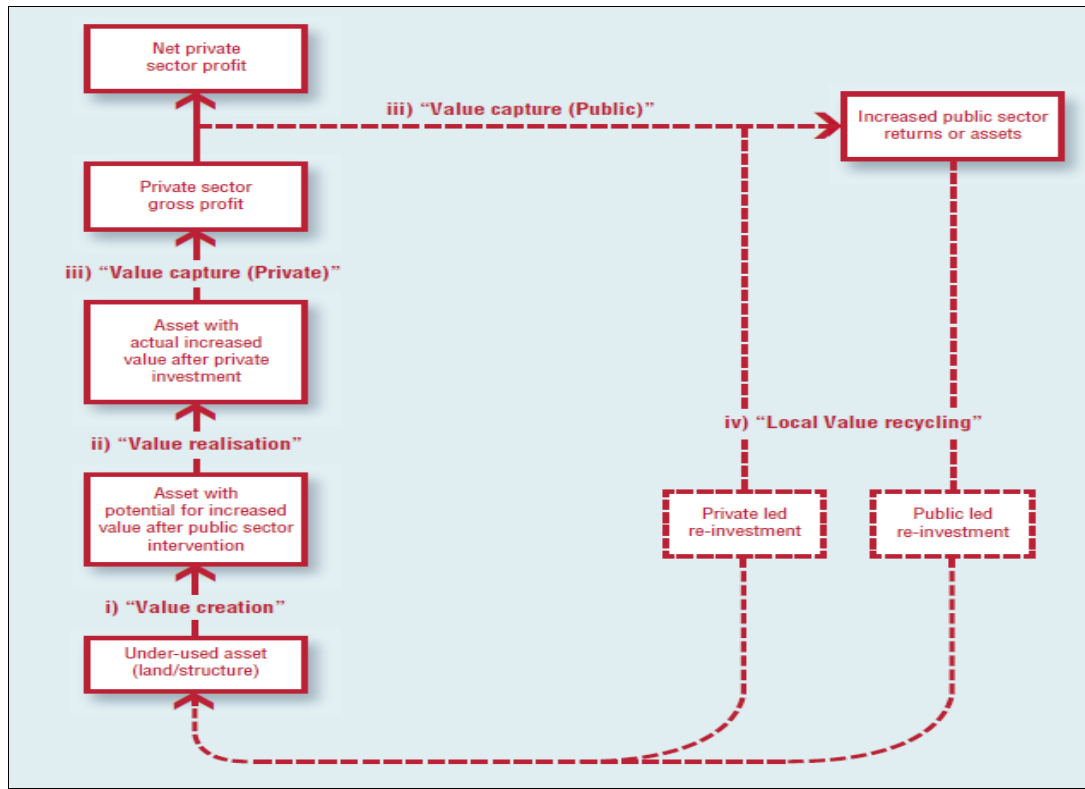
Source: Huxley, 2009.

However, we offer one caveat: it is disingenuous to use a standardised model of land value finance that may be replicated across cities. Relevant stakeholders such as local authorities should consider the range of financing options before deciding which tool or instrument or method is most appropriate for a city and a particular project. In its different forms, value capture financing is a mechanism that can combine wider public goals along with private objectives under the form of urban development funds, PPPs, and joint ventures. There are various techniques (strategies) that can raise capital for transport investment and in Table 1 we depict the main eight techniques.

Table 1. Innovative funding methods for transport infrastructure

TECHNIQUE	CHARACTERISTICS
Land value taxation	Land value tax is a type of value capture technique designed to capture the value created by the provision of public services more generally. It can discriminate the beneficiary of the tax, that is, the tax can for instance be directed only towards a specific group of householders. It assesses land value rather than property value and focuses on landowners.
Negotiated exactions	Negotiated exactions require developers to contribute, which may involve giving up part of their land of facilities in return for far greater off-site benefits, such as better transport benefits. The costs for the developer are both upfront: by providing land or making a payment with the money to be used for infrastructure serving the development. (Nelson et al., 1995).
Tax Increment Financing	This funding method estimates the level of development that will occur as a result of the transport improvement and uses this funding stream as the basis for securing a bond to help fund the transport scheme in the first place. Expected growth in property tax revenues are securitised to provide funds for infrastructure improvements. The existing and potential uplift in property values caused by a new infrastructure improvement is identified. This method can provide a sustainable stream of funding.
Special Assessments (SA)	This is a fee collected by the city for improvements of services the city provides that benefit property owners. The benefit may be a new transport development. The calculation of the impact of the intervention, and how much should be charged for that is conducted through a range of methods such as measurement of distance from the nearest enhanced service and total property area.
Joint Development (JD)	Joint Development is a partnership between public sector and private operator and developers in order to share the financial burden of the transport investment.
Transportation Utility Fees (TUF)	In TUF a transportation improvement is treated as a utility (e.g. water, electricity) and is paid for by a user fee. Rather than establish a fee with respect to the value of the property, the fee is estimated on the number trips that property would generate.
Development Impact Fees (DIF)	These are one-time charges applied by a local governmental agency to an applicant in connection with approval of a development project for the purpose of financing a portion of the cost of public facilities related to the development project.
Air rights	Air rights are a form of value capture that involves the establishment of development rights above, or in some cases below, a transportation facility that generates an increment in land value. These further developments are expected to lead to increases in land value. One of them e.g. selling rights to build a station with shopping spaces on top of a metro exit to a private actor, as this will increase land value and be beneficial for both the public and private party.

As we can see from Table 1, land value capture finance (LVC) is not merely a one-off mechanism for recouping the costs of public infrastructure investments; instead it can be seen as a grouping of methods, because the aforementioned techniques in fact enable local authorities to trade anticipated future income for a present benefit. With regard to part-financing transport infrastructure projects using LVC mechanisms, it is important not only to understand the urban context of the project, but also to be informed about the country where LVC tools are being proposed, such as the condition of the economy, taxation and planning

systems, public and political attitudes towards funding, and how coordination between key players is undertaken.

The objective of this report is to examine how land value capture related to transport investment can be used as a mechanism to finance urban transport systems. Our primary focus is to estimate the increase in land value due to the increased accessibility that the development of the new metro line in Warsaw may determine. Based on this result, we then analyse the different alternatives of how, within the context of the Polish fiscal framework, we can recapture the increase in land value of the Warsaw metro investment.

Before addressing the specific case study of the Warsaw metro, in the following sections we review the three main land value capture mechanisms. Betterment tax is the value capture levy on property that has benefited from transport infrastructure gains. Tax increment finance is an economic development package, and the joint development mechanism is a cooperation system between the public sector and private developers. In sections 4 and 5 we describe the local government structure in Poland and discuss the public finance decentralisation process. Section 6 is dedicated to the fiscal system and discusses the actual role of local taxes in terms of revenue streams for the local government. We describe in section 7 the property taxation system, the planning system and non-recurrent taxes imposed on land in Poland. In section 8 we examine the case study of the Warsaw metro, where we show the results of the analysis and its implications from the financial perspective. In sections 9 and 10 we draw our main conclusions by considering a number of recommendations for possible reform within the Polish public investment system.

2.   Land Value Capture Mechanisms

2.1   Betterment Tax

The assumption of a betterment tax (also known as *benefit assessment* or *betterment levy*) is to cover the transport investment costs through the value capture, which raises the land value at no cost to the developer/owner. Betterment tax is directed towards the beneficiaries of increased accessibility, reduced congestion and pollution, and lower transport costs that can be achieved due to a public transportation investment (Medda, 2009).

The betterment mechanism has several advantages, the most noteworthy being that it shifts the burden of infrastructure finance from the general public to the properties that directly receive the benefit, while avoiding the short-term time horizon of purely private infrastructure

provision. In Table 2 we present a short description of four mechanisms discussed in the economic and planning literature which are capable of capturing betterment value. The application of a particular mechanism should be considered within each city and country's unique context.

Table 2. Mechanisms capable of capturing betterment

MECHANISM	DESCRIPTION
Government purchase and ownership of land, with resale at developed land prices or providing development and use rights through long-term leases.	This enables value increments created by re-zoning (or the expectation of investment in social infrastructure) to be captured. There are substantial practical difficulties associated with such an approach in any areas other than on the urban fringe where the land commissions have established an acceptable political and institutional precedent.
A uniform land tax, paid annually without discrimination.	This is an effective and non-distorting approach that would also appropriate increments generated within use classes and not only at the time of upgraded development rights (as is normally proposed with betterment taxes).
A tax on income generated from the sale of land and buildings at appropriate personal and business tax rates, providing tax deductibility for the value of improvements.	This would act as an effective betterment tax. Such a system could replace capital gains tax (at least as it applies to land and buildings).
Taxes or charges applying to the 'unearned increment' of value increases only.	The classic application of betterment taxation theory. It seeks to capture the difference between the unimproved value of the land at its current use and its unimproved value following re-zoning.

Source: Fensham and Gleeson, 2003.

Betterment tax is seen as an equitable and efficient levy. It recovers the added value on private land assets accrued with the transport investment. In PPP contracts, betterment tax can constitute the public sector's financial device for sponsoring a transport system. Examples presented below in Table 3 indicate that betterment tax is most effective in robust markets where well-established tax administration systems can be observed.

Table 3. An example of Betterment Tax: The Hong Kong metro system (MTR)

Meakin (1990) stated that the Hong Kong metro system is "the only underground mass transit railway in the world which earns unsubsidised fare revenue sufficient to cover all costs, including depreciation plus operating profit margin". The MTR Corporation is comprised of 91 km, with 53 stations and deploys over 1000 rail cars with an average weekday patronage of over 2.5 million. The construction of the MTR was announced in 1973 with an initial cost of HK$ 5000 million, and the Hong Kong government, which was the only shareholder, provided one third of the initial capital investment, and the rest of the investment was raised by other financial mechanisms.

The Hong Kong government was able to raise the capital investment also by capturing economic rents from the nationalised land. In the case of Hong Kong all land is state property and the government leases the land based on a specific land contracting system. Between 1996 and 2000, for instance, annual revenues generated from public land leasing "where more than enough to cover the costs of all infrastructure. On average, lease revenues accounted for 17% of total government revenues" (Hong, 1998).

For the Hong Kong Metro System land value capture represented a financial windfall. In 1982 the system was already showing a profit, partly due to the increase in land value along the metro line. However, it is interesting to observe how this income from land value increase and development "was deliberately not taken into account in the original viability projections" (Meakin, 1990).

The financial performance of the MTR Corporation presently leverages the railway assets by including rental of station retail units, advertising in trains and stations, developing residential property, and owning shopping centres and offices.

The betterment taxes in Hong Kong are based on full market value.

2.2   Tax Increment Financing

Tax increment financing (TIF) is a mechanism based on using anticipated future increases in tax revenue to finance current infrastructure improvements which are thereafter expected to generate the increased revenues (The British Property Federation, 2008). TIF is able to finance part of the public and private costs associated with a designated redevelopment area (often called TIF area) by capturing increased tax revenues.

Widely used in the United States, TIF is traditionally implemented to fund urban renewal projects, affordable housing and public infrastructure. It aims at promoting efficiency of public investment in infrastructure by creating an incentive to locate where there is infrastructure capacity. TIF projects must not only generate a level of tax revenue at least equal to the cost of the project, but they must also be economically efficient, that is, equitable. "*Projects with a positive net present value are more beneficial when the municipal tax rate is higher, in spite of the reduced relative subsidy from the overlying government*" (Dye and Sundberg, 1997). Figure 2 presents the scheme of setting up a TIF mechanism.

Figure 2. Tax Increment Financing Scheme

A municipal authority or business proposes an establishment of a TIF area. At this stage, a general estimation of property values and tax revenue is made in relation to the project.	**TIF initiation**
A detailed study is prepared which demonstrates that the district meets the criteria for setting up a TIF in accordance with existing legislation.	**Formulation**
Municipal authority sets up a redevelopment agency whose task is to prepare a development plan for the proposed TIF area.	**Adoption and Implementation**
Usually two streams of property taxes within a TIF area are available. The first is based on the original assessed value of the property before any redevelopment. The second stream is the additional tax money generated after development takes place. Revenue is used to pay off municipal bonds, for land acquisition or direct payments to private developer.	**Collection of increments**

Tax increment finance schemes operate through fiscal incentives as tax relief, tax breaks or through tax disincentives in order to encourage urban development. What should be emphasised when proposing a TIF is that this funding method does not create a tax burden for businesses. It is a flexible instrument in which the generated revenue can be used either to secure a loan, encourage an up-front investment, or a pay-as-you-go development initiative in the area.

Table 4. Tax Increment Finance: The Case of Chicago

TIF has been used in Chicago to fund many transit projects. For instance, it was used to support subway construction in which three public transportation projects in the downtown "Loop" were funded with tax increment revenue. The Randolph/Washington Station received $USD 13.5 million in tax increment funds and the Dearborn Subway-Lake/Wells subway received $USD 1.2 million in tax increment funds.

2.3   *Joint Development Mechanism*

In the context of funding sources for infrastructure investments, joint development is a mechanism of cooperation and cost sharing between public sector and private operator or developer. Various examples of joint development have been applied in many transport investments, particularly in mass transit systems (Landis, Cervero, Hall, 1991). Joint development generally refers to the partnership between public and private sector in a collaboration of financing, construction, operation or maintenance of projects.

An advantage of using joint development is that it is not necessary to identify the direct and indirect impacts of the transport investment, as must be done in the betterment tax or with tax increment financing, since there is cooperation between the public agency and the private developers who share construction costs. Joint development promotes efficiency and benefit equity among participants, thus creating a win-win situation. Private developers benefit from better accessibility and more potential customers, and the public sector benefits through the sharing of construction costs. Among the mechanisms presented here, joint development is the most easily applicable instrument, for example, in a PPP agreement, because it is technically straightforward to implement in the contractual framework (Medda, 2009).

By not using taxation mechanisms, joint development does not raise equity issues. However, it should be noted that the success of this investment partnership depends on the correct forecasting of the demand for the transportation facility as well as the stability of the real estate market. Moreover, what decides the success or failure of a joint development mechanism is the macro and micro economic environment and the structure of the considered urban area (Report *Transportation for Tomorrow*, 2007).

Table 5. Two cases of joint development projects

Example 1. Washington Metropolitan Area Transit Authority (WMATA), USA

The aim of the project in Washington has been to incorporate private developers who would contribute to the capital and operating costs. What makes the WMATA case interesting is their use of several approaches of joint development. To generate higher income and to receive contributions from private investors for station construction costs, they offer property for residential, retail and commercial activity and development near and above stations. Moreover, they sell and lease land, as well as air rights. The amount of revenue WMATA collects from its decisions confirms the success of the project. The joint development projects had generated over $60 million USD by 1999. By 2003 was estimated to increase to $150 million USD (WMATA, 2008).

Example 2. Tama Den-en Toshi, Tokyo, Japan

The project differs from the standard public-partnership project scheme. In the Tokyo case, the project did not involve direct government intervention or subsidy. However, it stands as a good example of joint development between the private sector, Tokyo Corporation, and landowners. The main objective in this project was the use of land readjustment to obtain the land needed for the rail project and development of real estate. What differentiates this project from others is that Tokyo Corporation organised all the landowners to form a cooperative to consolidate the properties without transferring ownership; at the end smaller but fully serviced parcels were returned to landowners. Tokyo Corporation did not charge cooperatives for redevelopment works, but acquired reserved housing sites after completion of the redevelopment. It then promoted the area's development through selling land, constructing housing, attracting shopping centers and schools, which increased the population and rail rider ship of the area (Kuranami et al., 2000; Farrell, Tsukada and Kurawami, 1994).

Capturing sufficient revenue on land in order to ensure the provision of a set of services that communities and fast-growing cities need is a major public policy challenge also for the present Polish government. Including the aforementioned elements of delivering a sustainable transport system, we will discuss in the next section the financial mechanisms for metro system investments.

3.   Innovative Financing Models for Metro Systems

Capital gains arising from land value increments contribute in some cases a major source of income. In recent years, major public infrastructure developments in cities have delivered considerable windfall surpluses to owners of land in the proximity of transport investments. Worth quoting is the Sydney case study, where it has been estimated that the development of major new motorways in the past decade has resulted in "*a 30 to 60% increase in values for properties around them*" (Kumar, 2001).

As previously discussed, one approach to recoup the windfall is to implement a land tax. However, when a tax is imposed, two outcomes may occur – a government gains revenue

and secondly, there is a potential for a reduction in the overall welfare of the economy. Tax on an inelastic factor, here land, causes a reallocation of income from a private economic actor to a government entity but creates no efficiency reduction. For this reason we need to consider the spectrum of financial options for transport investment.

The introduction of land value capture finance (LVC) should not be limited in scope through the implementation of a land tax, because LVC approaches have a wider role to play in supporting efficient planning and urban management systems. Five imperatives could be pointed out to support the case for LVC as an urban management tool. These are:

- the need to reduce costs in the land development process;
- promoting more efficient and productive capital flows;
- the need to fund the management of urban and economic development, including preserving access to the planning system for a range of interest groups;
- the need to acknowledge the role public sphere investment has on 'overheating' inner city property markets, and recoup the costs of this investment;
- the need to redistribute the globalisation 'dividend' from inner to outer parts of the metropolitan area.

The potential advantage of a land value capture is that the revenue from, for example, a tax can be used to fund public projects that may subsequently increase the net return (rent) to the landowners. The literature suggests that investment in transportation infrastructure, including highways, freeways, light rail, heavy rail, subways, and bus routes, results in measurable increases in the surrounding property values (Ihlandfeld and Raper, 1990; Dewees, 1976; Gatzlaff and Smith, 1993; Benjamin and Sirmans, 1996; Workman and Brod, 1997). Therefore, a land tax that captures some portion of the increased value of this infrastructure might be an appropriate way of funding the investment. In Table 6 below we examine the implemented solutions in financing underground systems in Europe and North America in greater detail.

Table 6. Review of transport investment projects where land value capture mechanisms have been implemented

PROJECT	DESCRIPTION
Helsinki Metro, Finland (1982)	The only metro operating in Finland has been in operation for 25 years. Property prices within walking distance of nearest metro station have risen by 7.5% over other locations. Impact was most significant at a distance of 500-750m, as opposed to adjacent locations, where value dropped.
Copenhagen metro and Ørestad scheme, Denemark (2002-2007)	The Copenhagen metro and Ørestad scheme is a recent metro development which had a total cost of EUR 1.6 billion. Value was created from the design and construction of the new metro line. The increased accessibility to the adjacent land raised demand for it among developers and investors. 52% of the whole site was sold or under construction by the end of 2006, with overall sales totalling EUR 623 million. Furthermore, value was captured from direct payments (10%), real estate taxes (10%), and operating profits from metro (30%). Finally the captured value paid for the construction of the metro by repaying the EUR 2.3 billion debt incurred during construction process.
Jubilee line, London, UK (1992-2000)	London's Jubilee Underground extension cost £3.5 billion, raising the nearby land's rental value by £1.3 billion. Public collection of 25% of that increase would pay off the Jubilee line in 20 years.
Metro Toronto Subway, Canada (built during 1950s. and 1960s.)	Metro Toronto Subway was constructed during the 1950s and 60s. Analysis concluded that the tax assessment value near the city centre increased by 45% and by a massive 107% in the region of the suburban stations compared to a 25% increase in other areas. Along with these significant rises it was noted that rentable value of office space adjacent to the station were, on average, 30% higher than in the city as a whole. Another noteworthy indicator was that 90% of new office space and 40% of apartment buildings between 1959 and 1964 were constructed beside metro lines.
Tyne&Wear Metro, Newcastle, UK (1980-2008)	Average increase of £360 (1.7%) in the value of properties near metro stations during the four-month period surrounding the date on which each section of line opened.
Milan Metro, Italy	The special levy, "specific improvement assessment", was assessed on properties within 500m of station. This form of LID had raised 36 billion lire, but following its initial success the levy was replaced by a real estate transfer tax that feeds into the local general fund.

Source: Wetzel 2007, Smith and Gihring 2006, Higginson 1999, Ridley et al. 1987, Riley 2001.

In our discussion on the implementation of a land value finance mechanism, we observe the importance of the contextual situation and this should be seen as input to any analysis. Hall and Marshall (2000) point out two elements: the general economic situation and regulatory context, e.g. planning control, as significantly important regarding transport investment on development. For instance, similar transport investments will have different impacts in locations where there is a vibrant local economy and where the economic conditions are less advantageous.

Given the aforementioned, and our goal to estimate the land value increase due to the Warsaw metro investment, we need to review the structure of the Polish fiscal and planning system, since the heart of a successful land value capture program lies in the attention to detail on the current specific fiscal and planning practice as well as to the procedural

boundaries of the country under consideration (Kennedy et al., 2005). After having reviewed the decentralisation process of the fiscal and planning systems in Poland, we will be able to explore, on the basis of the estimation analysis, the different alternatives of land value finance solutions that adapt to the particular needs and peculiarities of Poland.

4. The Local Government Structure in Poland

Poland, like many other new EU accession countries, has in the past ten years introduced comprehensive reforms and undertaken many infrastructure investments in its cities. The concepts of fiscal reform and urban infrastructure investment are to a certain extent aligned, given the fact that urban infrastructure investments induce an increase in land value in the area around the system improvement. It is therefore possible to recover the capital cost of the urban investment by capturing some or all of the increments in land value resultant from the investment through a fiscal mechanism such as land value finance (tax, incentives, development agreements).

The economic transition process in Eastern European countries such as Poland has effectively contributed to the decentralisation of the political structure and enhanced the autonomy of the fiscal systems. Tax reform – accompanied by institutional and structural reform – represents a critical step for the success of the Polish economy.

In the Polish reform process the years 1989/1990 were a turning point. Before 1990 Poland had been a highly centralised state with local governments dependent on central government decisions. The reform process aimed to 'dismantle' five main monopolies existing within the centrally planned economy:

1. political monopoly of the communist party that had the power to select representatives for local councils;
2. state power monopoly on public life (hierarchical dependency of tiers of government);
3. state property monopoly;
4. financial monopoly (state budget monopoly) that disallowed financial autonomy of municipalities. Local budgets were incorporated as part of central government finance;
5. monopoly of the state administration (Council of Europe, 1992; Regulski, 2003).

Subsequently, the EU accession certainly acted as a catalyst for reform. Poland readily adopted a western-oriented public institution and introduced comprehensive tax reform that

nevertheless corresponded to Poland's specific circumstances (Martinez-Vezquez and McNab, 2000).

The present structure of local government in Poland is the result of two reforms. In 1990, through the Act on Territorial Self-Government (title changed in 1999 into the present one: the Act on Municipal (Self-) Government), the municipal tier of local government (gmina) was introduced. As Swianiewicz (2002) observed, the addition of a complete new local government body was like a "jump into the deep end", because rather than to prepare carefully detailed implementation plans in advance, only general directions for reform were outlined.

The reform established 2,478 new municipalities thereby pursuing political, fiscal and administrative decentralisation of the Polish government structure. Articles 43 and 44 of the 1952 Constitution (amended in 1990 and in force up to 1992, i.e., until the enactment of the Small Constitution) ratify that a municipality is "the fundamental form of organisation of public life" and "it is a legal entity and executes public activities on its own".

The second wave of reforms took place in 1999 when two new tiers of elected sub-national governments – county (powiat) and regional (voivodship) – were introduced. The reform was prepared and implemented rapidly in order to introduce a government system along the lines of those in place in EU countries. Table 7 summarises the main stages of reforms undertaken in Poland.
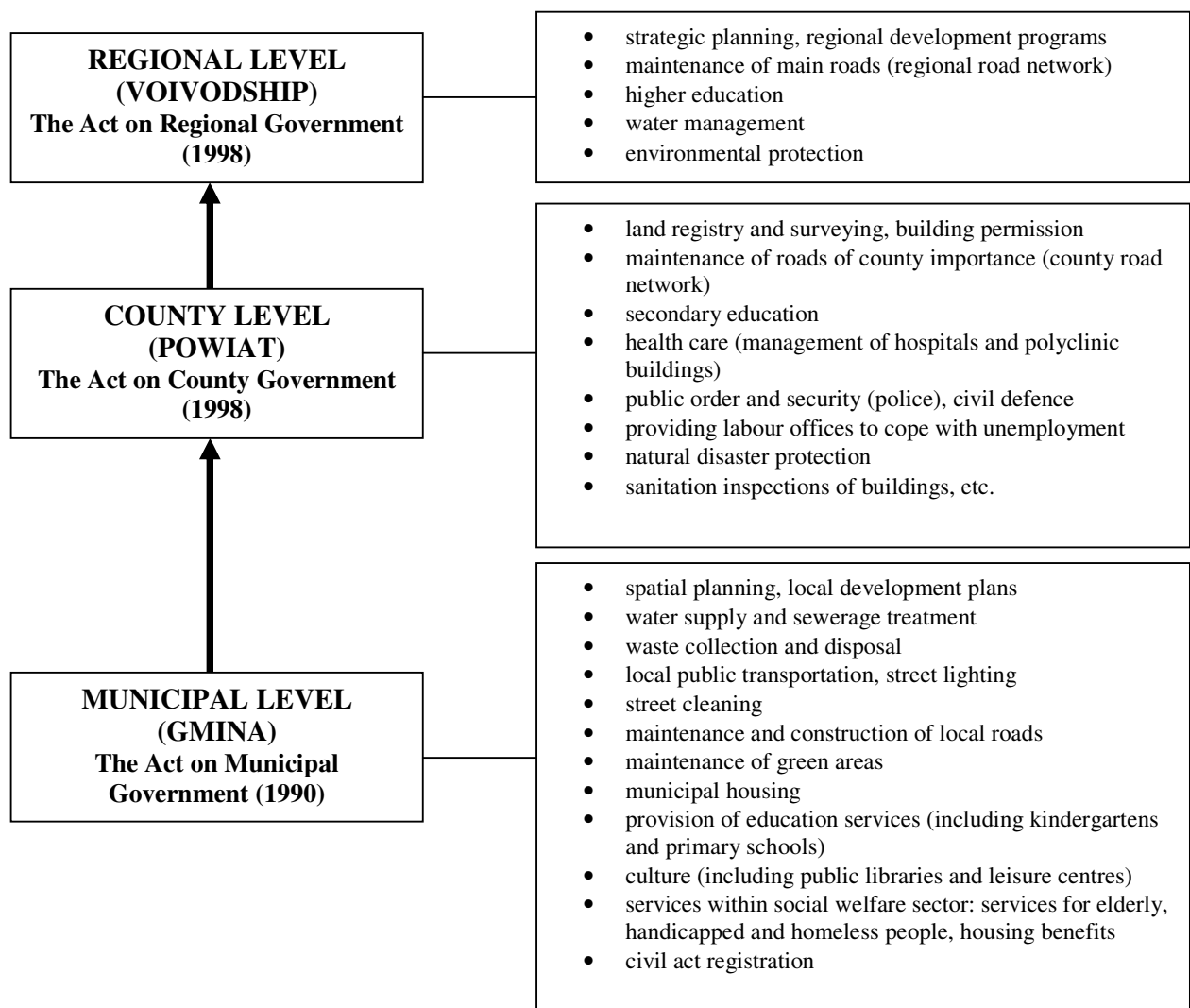
Table 7.   Stages of territorial government reform in Poland

Mid 1970s	Poland was divided into 49 voivodships and 2478 municipalities (gminas), functioning as part of a centralised administration system.
1980s	Administrative units gained relative independence, though not guaranteed by law, and municipalities (gminas) remained under the control of the central administration.
1990	The law on territorial self-governments, which provided independence for about 2,478 municipalities (gminas) was passed. However, 49 voivodships remained under the control of central government.
1999	Division into three tiers of territorial self-government: - 2,478 municipalities (gminas), - 325 counties (powiats) that include several municipalities (gminas), - 16 regions (voivodships).

Source: Bindebir, 2004.

As a result of the reform process, the Polish administration system is comprised of three tiers of territorial government: municipal (2,478), county (379) and regional (16). Municipal units in Poland are relatively large in size in order to avoid territorial fragmentation, as we may observe in Hungary, Slovakia and the Czech Republic, so as to allow a proper allocation of function and responsibilities. The average municipality (gmina) has a population of 16,000 inhabitants over an area of 125 sq kilometres (Council of Europe, 1998). Figure 3 depicts the interrelation between the three territorial government tiers and their responsibilities.

Figure 3. Responsibilities of territorial government bodies in Poland

REGIONAL LEVEL (VOIVODSHIP) The Act on Regional Government (1998)	- strategic planning, regional development programs - maintenance of main roads (regional road network) - higher education - water management - environmental protection
COUNTY LEVEL (POWIAT) The Act on County Government (1998)	- land registry and surveying, building permission - maintenance of roads of county importance (county road network) - secondary education - health care (management of hospitals and polyclinic buildings) - public order and security (police), civil defence - providing labour offices to cope with unemployment - natural disaster protection - sanitation inspections of buildings, etc.
MUNICIPAL LEVEL (GMINA) The Act on Municipal Government (1990)	- spatial planning, local development plans - water supply and sewerage treatment - waste collection and disposal - local public transportation, street lighting - street cleaning - maintenance and construction of local roads - maintenance of green areas - municipal housing - provision of education services (including kindergartens and primary schools) - culture (including public libraries and leisure centres) - services within social welfare sector: services for elderly, handicapped and homeless people, housing benefits - civil act registration

We can observe that the municipal level within the local government structure handles a spectrum of responsibilities and duties broader in scope than the other two local government

tiers. The reason for this has to be found in the subsidiarity principle on which the Polish system is based[1], and had preceded even the conclusion of the Association Treaty with the EC. Nowadays, the subsidiarity principle is a fundamental doctrine of the European Union which was introduced into the statutory regulations of the European Communities in the Treaty of Maastricht on 7 February 1992. The Treaty highlights the importance of the municipal level in order to create "…an ever closer union among the peoples of Europe, in which decisions are taken as closely as possible to the citizen in accordance with the subsidiarity principle". When we compare the Polish municipalities before and after the decentralisation reforms, it is possible to recognise that local bodies have gained substantial political autonomy, which is reflected in the structure of the public finance system. By being in control of all main local public services, municipalities are, from the point of view of land value finance, one of the major actors to be considered. Municipalities manage public housing, transport and land use planning; they also preside over the acquisition of land, buildings and public facilities, along with any profit-oriented economic activity and establishment of municipal ownership rights.

5. Decentralisation of Public Finance: Local Budget Revenues and Expenditures

The decentralisation of public finances was introduced by the Act on Territorial Self-Government of 1990 and separated the municipal (gminas) budgets from the state financial system, thus giving municipalities financial management and autonomy in planning their budgets and tax revenues. Since 1990, an evolutionary approach to reform was adopted in order to maintain economic stability and stimulate investments. The process was completed in 1998 when the Polish Parliament endorsed the Act on Public Finance. However, the important changes were introduced by the Act on Revenues of Territorial Self-Government in 2003 and two subsequent Acts on Public Finance.

The county and regional tiers are funded mostly by grants and shares in state revenues, whereas municipalities are financed by a portfolio of municipal revenues, shares in state revenues and grant transfers from the State[2]. According to the current Polish law, municipal revenues derive from:

---

[1] The subsidiarity principle in Poland was formally declared in the 1997 Constitution, but had been already widely recognised since 1990 as the doctrinal foundation of the restoration and development of territorial self-government in Poland.
[2] The supervision of municipal financial management is performed by regional audit chambers (Regionalne Izby Obrachunkowe, RIO). These are independent bodies with technical competences; they evaluate municipal expenditures only in terms of their consistency with the law.

- local taxes, fees and charges,
- local shares in central taxes,
- central general purpose and specific grants,
- earnings from council rents and from the sale of communal property,
- budget surpluses from the previous year,
- revenues from loans and bonds.

In 2007 the revenues of local municipal budgets amounted to PLN 57,003 mln, of which 46.6% (26,535 mln PLN) was constituted by municipal revenues. However, the major source of funding for all local governments in Poland stems from the State transfers (*subwencje*), which amounted in 2007 to 31.3% of total municipality revenue, 46.1% of the total county revenue and 18.6% of regional revenue. The second most important source of revenue in 2007 were shares in income taxes corresponding to 17.4% in municipality income, 17.1% in county income, and 52% in regional income. The revenues accrued from local taxes remain a small part of the total revenue for local government bodies (Figure 4 and Table 8).

Figure 4. Revenues of municipal budgets by type, 2003-2007
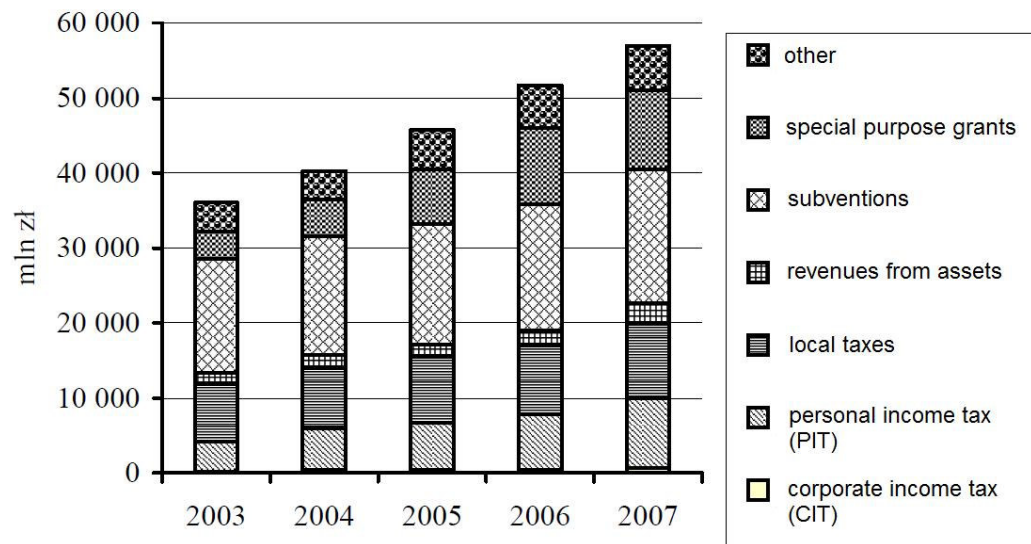
Source: Central Statistical Office of Poland (GUS), 2008.

Table 8. Revenues of municipal budgets by type (in mln PLN).

	2003	2004	2005	2006	2007
TOTAL	**36046,3**	**40308,5**	**45813,2**	**51724,3**	**57003,1**
Agricultural tax	863,5	906	949,9	795,8	915,4
Property tax	6028,2	6501,2	6994,9	7270,1	7595,6
Vehicle tax	333,5	361,4	385,1	426,3	488,2
Personal income tax (PIT)	4010,3	5466,1	6269,9	7368,6	9264,7
Corporate income tax (CIT)	224,6	398,9	442,8	501,9	657,4
Subsidies from state budget	15217,6	15821,2	16080,3	16880,1	17865,6
Special purpose grants	3335,1	4545,7	6887,8	9782,7	10340,5
General purpose grants	437,9	497,2	544,6	553,5	578,1

Source: Central Statistical Office of Poland (GUS), 2008.

In order to assess the actual revenue autonomy at the local level and thus the public finance condition, we need to examine the local expenditure structure. The public expenditures of which local government is responsible are: land management and planning, local environmental protection, municipal budgets and property management, public transport system provision, municipal housing, water supply, municipal waste treatment, primary education, and the promotion of culture and sport. All the above presented categories of obligatory tasks are very specific in Polish legal terms, and its scope of application is very limited.

In 2007 the total Polish expenditures amounted to PLN 56 074 mln. The main local government expenditures cover the costs of obligatory tasks which are regulated according to legislation (Figure 5. and Table 9). We can observe that, given the expenditure structure, very limited capability is given to local authorities in Poland with regard to investments in R&D, infrastructure, heath, and education.

Figure 5. Structure of municipal expenditures in Poland in 2008 by type.
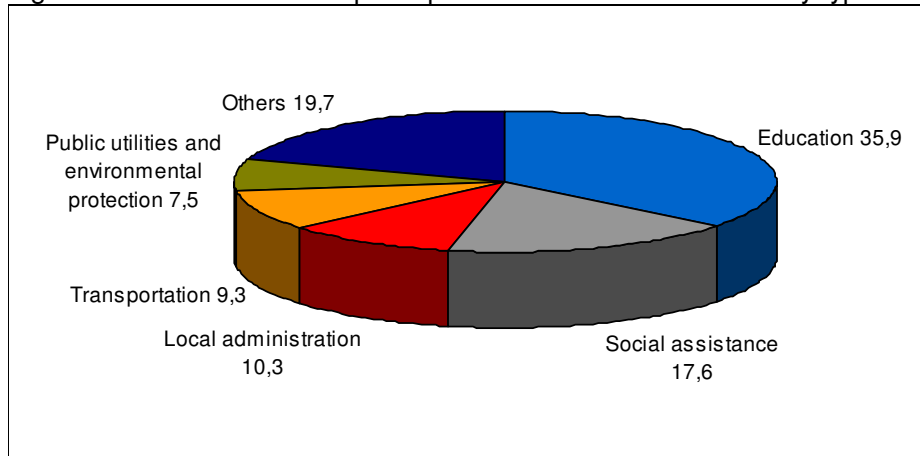
Source: Central Statistical Office of Poland (GUS), 2009.

Table 9. Structure of municipal expenditures by type in 2003-2008 (%)

	2003	2004	2005	2006	2007	2008
Agriculture	3,2	3,1	2,6	2,9	2,8	2,9
Transportation	6,0	7,0	7,2	8,8	8,4	9,3
Housing	2,6	2,7	2,8	2,9	3,1	3,4
Local administration	12,5	11,6	10,9	10,0	10,4	10,3
Education	40,4	42,7	39,6	36,1	36,5	35,9
Health care	0,9	0,9	0,9	0,8	0,8	0,8
Social assistance/ services	11,0	13,9	17,1	19,7	19,2	17,6
Public utilities and environmental protection	8,8	8,4	8,3	7,7	7,4	7,5
Culture and arts	2,9	2,8	2,9	3,2	3,2	3,2
Other	11,7	6,9	7,7	7,9	8,2	9,1

Source: Central Statistical Office of Poland (GUS), 2009.

The percentage of local government expenditure in Polish GDP (as well as in total government expenditure) has increased year on year, and this trend has certainly raised concerns about the scope, speed and stability of the tax reform. In 1991 total local government expenditure amounted to 7.4% of GDP and 16% of total expenditure, and by 2001 it had increased to 10.6% of GDP and 38% of total expenditure. In 2005 local government expenditure was even higher and amounted to 43.3% of GDP.

There are identifiable general reasons to explain why the ability of local government to finance the expenditure needs is closely related to the breadth of revenue assignments and

to the scope of local decision-making (Oulasvirta and Turala, 2009). To a large extent there are clear benefits that arise from fiscal and administrative decentralisation, two in particular are: an improved system for the efficient allocation of public services, and a positive influence on macro-economic growth. An OECD analysis (2004) of fiscal decentralisation in developing countries indicates three elements that are strongly related to the successful fiscal decentralisation process: democracy, local accountability and competent financial management in local government.

In retrospect, the current public financial system suffers from two main drawbacks. The first is related to the limited autonomy in the decision-making process. Local authorities have to fulfil all activities under their obligatory status. Second, in practice all local authorities are heavily dependent on government subsidies and general and special purpose grants. As mentioned above, tax revenues and levies, as well as other sources of revenue for local government bodies, constitute only one-third of their total income, which is very limited if we compare Poland to OECD countries such as Finland, where local revenues (own tax revenues, local set tax rates, selling and other activity own incomes) accrue to 70% of the total revenue. In the next section we will focus on property taxes, the main fiscal tool within the land value capture approach.

6.   The Local Fiscal System in Poland. Property Taxation

In tax policy we can recognise two main models of local taxation systems in relation to the source of revenues: models based on property taxes and models based on local income taxes (Swianiewicz, 2003). In the first models property taxes are the most significant tax within the structure of the local tax system because they have the major assignment of revenues. Property taxes play an important role in many countries, for example, the United Kingdom, France and Spain. The second model is based on local income taxes; this type of tax is applied mainly in Scandinavian countries.

During the 1990s, in the early phases of the transition process, Poland introduced individual and corporate income taxes which was followed by the implementation of indirect taxation in the form of value added (VAT), excise taxes and local wealth-based taxes. The subsequent fiscal reform in Poland was driven mostly by the need to comply with EU rules, in particular in the area of direct taxation.

The current tax system is grounded on The Constitution of the Republic of Poland (2 April 1997), which was enforced on 17 October 1997 (Journal of Laws No. 78, item. 483). But

more detailed regulations concerning the taxation system and local government finance are enclosed in the following specific acts (all with additional amendments):

- The Constitution of the Republic of Poland
- The Act on Municipal Government (formerly called the Act on Territorial Self-Government, 1990)
- The Act on County Government (1998)
- The Act on Regional Government (1998)
- The Act on Public Finance (2009)
- The Act on Local Fees and Taxes (1991)
- The Act of Revenues of Territorial Self-Government (2003).

The Polish tax system currently consists of nine direct taxes (personal income tax (PIT), corporate income tax (CIT), tax on civil law transactions, real estate tax, tax on means of transport (vehicle tax), inheritance and donations tax, agricultural tax, and forestry tax) and three indirect taxes (tax on goods and services (VAT), excise duty, game tax[3]). Table 10 shows the different direct taxes which represent revenue assignments for different levels of local government.

Revenues from direct taxes constitute the main income for municipalities. Income taxes from individuals and from business have the highest share in the budget structure, followed by property taxes. However, Polish property taxes provide a relatively small share of total municipal tax revenues compared to other western countries (Martinez-Vazquez and Wallace, 1999). Poland has three main taxes levied on property (property tax, agricultural tax and forestry tax); in 1998 they amounted to approximately 13.4% of total local revenues, whereas in 2007, they comprised 15% of the total. Moreover, municipalities are in charge of collecting additional revenues from properties, e.g. from the sale of plots or buildings and long-term lease or rent.

---

[3] The provisions of the tax regulations also apply to fees and other charges to state budget and budgets of local government units. Precise information on specification and regulation may be found in the Act on Public Finance (2009) and the Act on Local Fees and Taxes (1991).

Table 10. Direct taxes in Poland and eligible recipients of revenues from taxes

Tax type	Entities obliged to pay taxes	Budget eligible to receive tax	Revenues in mln PLN			
			2003	2005	2007	2008
Personal income tax (PIT)	Individuals	State budget, municipal budget (39,34%), county budget (10,25%), regional level (1,6%)	9519,1 (12%)	17762,7 (17,3%)	25600,4 (19,5%)	28534,9
Corporate income tax (CIT)	Legal entities, non-corporate organisations	State budget, municipal budget (6,71%), county budget (1,4%), regional budget (14%)	785,3 (1%)	5026,5 (4,9%)	7615,8 (5,8%)	7474,2
Tax on civil law transactions		Municipal budget	957,9 (1,2%)	1194,5 (1,2%)	2608,6 (1,6%)	2286,0
Property tax	Legal entities, individuals, non-corporate organisations	Municipal budget	10123,3 (12,8%)	11668,6 (11,3%)	12702,4 (9,7%)	13447,4
Vehicle tax[4]	Legal entities, individuals, non-corporate organisations	Municipal budget	571,5 (0,7%)	661,8 (0,6%)	812,6 (0,6%)	827,1
Inheritance and donations tax	Individuals	Municipal budget	-	-	313,3	324,5
Agricultural tax	Individuals	Municipal budget	878,2 (1,1%)	966,8 (0,9%)	931,5 (0,7%)	1227,9
Forestry tax	Individuals	Municipal budget	-	-	157,1	174,9

As previously mentioned, Poland has three obligatory taxes on land (see Table 11 for a review). The agricultural property tax (1985) and the property tax (1986) were implemented in order to expand the tax base by considering non-income areas and capture wealth at a time of declining government revenues and worsening macroeconomic conditions. The third tax related to property – the forestry property tax – was introduced in 1992.

In this context it is important to stress that the major element of the political and economic decentralisation process in the 1990s was led by the idea of transferring state property to local governments. The municipalisation process has had a legal basis in respective

---

[4] A tax on vehicles is paid to the municipal budget where the tax payer lives, or on the territory where a company-owned vehicle is registered. Since 1998 the tax has been levied on lorry owners (load capacity over 2 tons), tractors, buses, and trailers (load capacity over 5 tons).

provisions of the 1990 Act containing Introductory Provisions relating to the Act on Territorial Self-Government and the Act on Self-Government Employees. It has transferred to municipalities most of the state-owned real estate related to urban services and housing, and vested the city authorities with civil code property rights (Malme and Youngman, 2001). Public properties were divided between the central agencies and local authorities. The 1991 amendments to the Act on Local Fees and Taxes have changed taxes related to property and since then they are the sole own-source revenues of municipalities.

Table 11. Property taxes in Poland

Property tax is regulated by the Act on Local Fees and Taxes (1991). Relating to Article 2 of this Act, property tax is imposed on: land, buildings, their contents, building construction, and on contents used for commercial activities. Property tax is paid by individuals and legal entities who own property. The taxable base of property tax in Poland does not depend on market value of the land. It refers to property size (the surface of the land per square meter) or usable surface in the case of a building or its contents. The tax rates are set by the local authorities; however, maximum rates for this tax are decided by government regulation and are adjusted annually against inflation. The maximum rates are presented below.

The maximum rates of property tax in Poland.

	2001	2003	2009
Land	0.46 PLN/sq.m	0.51 PLN/sq.m	0.74 PLN/sq.m
Buildings:			
• **residential**	0.56 PLN/sq.m	0.62 PLN/sq.m	0.62 PLN/sq.m
• **commercial**	15.86 PLN/sq.m	17.31 PLN/sq.m	19.81 PLN/sq.m
Constructions	2% of value[5]		

Note: 1 EUR = 4.07 PLN, 1 GBP = 4.69 PLN (26.01.2010)

Not every single plot of land is being taxed according to Polish law. The Act on Local Fees and Taxes (1991) exempts the following from paying property tax: properties used by local administration, foreign embassies, property with status as historical monument/building, universities, schools, and sport grounds.

Agricultural tax is regulated in a separate Act on the Agricultural Tax (1985). It is imposed on land regarded as agricultural. The responsibility of payment is laid on the land owner. The total tax is calculated by taking into consideration the average market price of the crop and the surface and quality of land (soil).

Forestry tax
The forestry tax is regulated by the Act on Forestry Tax (2002). This tax is imposed on owners, possessors, or perpetual usufructors of forests. The amount of tax depends on the price of wood at a certain period of time, as well as the surface of the forest.

---

[5] In practice, that value does not fully correspond to the market value.

Notwithstanding, Poland is one of the few European Union countries without *ad valorem* (value-based) tax on property. Property tax is instead calculated on the basis of the size of plot (area) or useable space of a building. For this reason, revenues collected from the three property taxes represent a modest share of total tax revenues. Property tax contributes approximately 3.5% of the total tax revenue, whereas agricultural tax and forestry tax much less – respectively, 0.3% and 0.04%.

We can now bring to the fore two main criticisms of the Polish tax reform and its overall fiscal system. First, municipalities (gminas) have a limited ability to increase revenues through changing rates, bases, and introducing new types of tax. Autonomy is granted to municipalities to decide upon rates of local taxes, however, the maximum rates of taxes are set by state regulations. Second, the current property tax system is based on the type and size of property rather than on its value. In 1995 the Polish government approved a draft reform tax to introduce *ad valorem* property tax. However, the political commitment for the implementation of *ad valorem* property taxation has weakened due to public opposition, thereby opening a subsequent debate in the public arena on the advantages and disadvantages of the reform. Nonetheless, property tax reform remains one of the official long-term goals of Polish government since this tax could effectively raise significant revenue for municipalities and, at the same time, allow central government to reduce the level of State transfers to local authorities. Moreover, local governments would be obliged to implement a more systematic and strategic management of land and property assets.

A possible alternative to *ad valorem* taxation is the approach embraced by the Czech Republic and Slovakia, which is to institute urban zoning systems (Swianiewicz, 2003). Within their zoning system, maximum rates of property taxes are differentiated depending on the size of their cities. The implementation of urban zoning could help to distinguish areas where land value is higher from lower land value areas, for instance, depending on the proximity to the city centre or main railway station of the considered area.

In the next section we will examine two types of taxes (non-recurrent) on property in the Polish planning system which are based on the *ad valorem* approach.

7.   Planning System in Poland. Non-recurrent Taxes on Property

The planning system in Poland has three fundamental objectives. First, to define the main goals of spatial development for the entire country, describe the responsibilities of the three tiers of local government, and co-ordinate the spatial activities of public authorities, including primarily their investment projects; second, to create a framework for a monitoring system of the land developments; and third, to strike a balance between public and private interests with a view to ensuring sustainable development. Those objectives are outlined in the following planning acts. The Act on Spatial Planning and Spatial Development (27 March 2003), is a fundamental regulation for spatial planning and land development at central, regional and municipal level. The Act on Building (7 July 1994) describes the technical requirements for structures and any related infrastructure and admission procedures for construction on specific land. Furthermore, the Act on Real Estate Management (21 August 1997) imposes and determines the collection of fees and assessments related to the development of urban infrastructure, as well as the issue of property subdivision, and stipulates that local authorities are responsible for collecting these fees.

According to the latter Act, within the Polish planning system two non-recurrent taxes on properties based on *ad valorem* formula, can be identified and are noteworthy as a potential source of income for public investments. These are:

- the adjacency levy (a type of betterment tax);
- planning gain (levy on increases in land value resulting from a change in land use).

Adjacency levy (*opłata adiacencka*) is regulated in the Act on Real Estate Management (1997). A (one-time) fee is imposed on property owners when there is an increase in the value of land occurring due to the provision of public services, subdivision of a plot, or the merging of plots. However, the fee should not exceed 50% of the increased property value due to the infrastructure provision, and should not exceed 30% when property value increases due to parcel consolidation or subdivision. Under Polish law, municipalities may impose an adjacency levy on owners of real estate (which includes holders of usufruct):

- in connection with the appreciation of the property value, following the erection of technical infrastructure;
- in connection with consolidation or subdivision of land or subdivision of property.

The decision of the levy rate is determined by the mayor and the municipal council. But calculating the increase in value is problematic and can be manipulated by assigning different degrees of importance to individual characteristics of a plot. This can therefore be

used to benefit the purposes of different stakeholders. Another problem is that the calculation is based on plot size, meaning that the rates used for calculation are the same for urban and rural areas of Poland. Taking into consideration the aforementioned, the usefulness of the adjacency levy is undermined because no incentive exists for developers.

Planning gain (*renta planistyczna*) is the second levy based on the *ad valorem* concept. It is regulated in the Act on Spatial Planning and Spatial Development (2003). The obligation to pay the planning gain arises as the result of adopting or revising a local development plan, i.e. changing land use, if the owner of the land decides to sell the plot and thus has to pay the levy in relation to the increase in land value. The planning gain levy is designed to compensate municipality expenses that occurred in the process of adopting a new local development plan. It can also provide an incentive for municipalities to offer properties for new investment in the city.

As presented above, the Polish municipalities have a legally-stated planning jurisdiction, which means that they have the right to adopt legal acts and planning documents that enable them to fulfil their duties and protect the proper development of cities, as well as to budget possible income resulting from changes in the planning documents. At the municipal level the preparation of two documents is obligatory – a general development strategy of municipality: the Study of Conditions and Directions of Spatial Development and Land Use (*Stadium uwarunkowań i kierunków zagospodarowania* przestrzennego) and a local development plan: the Municipal Physical Development Plan (*Miejscowy plan zagospodarowania przestrzennego)*. But only the local plan is an act of law and binds both public authorities and private parties engaged in the development or investment process. This document indicates the use of land, land development conditions and land ownership rights, and determines the location of particular types of public investments in the city. Investors in areas that do not have current local plans must necessarily comply with decisions of zoning regulation[6] and general development strategy for the city (*Studium*). The lack of local plans is at present the most difficult barrier for new investment projects.

Article 11 of the Act on Spatial Planning and Spatial Development (2003) states that local plans should contain projections on the impact of the investment. Moreover, it should forecast the income i.e., from property taxation and costs of technical infrastructure that the municipality should provide as its duty. But in most cases, such as changing land use or infrastructure investment, the increment in land value that should have been forecast, is not

---

[6] A zoning regulation decision sets the basic conditions according to land use, type of possible building to realize on a plot, and physical and technical parameters relating to a particular investment.

captured despite the direct statutory relationship required between spatial planning and urban investment in the Polish regulatory framework.

In the next sections we will analyse our case study, the Warsaw extension of the metro line, and we will show how this investment can induce relevant windfall of land value around the transport project.

8.   Case Study: The Warsaw Metro System

As previously observed, the extent to which metro systems affect line-side property values has been studied in a number of large cities, e.g., Washington DC (Lerman et. al., 1978), Toronto (Bajic, 1983), San Francisco (Landis et al., 1995), and Atlanta (Nelson, 1992). Most of the studies confirm that metro systems significantly influence property values, but that the impacts vary among cities. The influence of the Warsaw metro system, however, has not yet been empirically studied.

The innovative aspect of this study is to estimate the effects of metro access on property prices in Warsaw in two selected districts: Bielany with its existing metro line and Targówek, where a planned metro line will significantly improve transport service, with direct connections to the city centre and reductions in journey time. We will examine a dataset comprising 1130 real estate transactions along the existing and planned metro lines. The methodology adopted is a multi-regression model based on hedonic price modelling (Rosen 1974, Sheppard 1999). Our objective is to verify the capitalised valuation of the transport infrastructure on the property value in order to identify possible alternative financial resources for transport investment.

8.1   The City of Warsaw: Main Characteristics

Warsaw is the capital and the largest city in Poland, with a population in 2009 of 1.714,446. Since the year 2000, Warsaw has grown steadily, on average 4.5% (between 1995 and 1999 the population decreased by 1.2%, but from 2000 to 2005 it rose by 5.1%). Warsaw's population density is the highest in Poland and is equal to 3.293 persons per sq. km (GUS, 2009). The Status Act of 2002 (*Ustawa z dn. 15 marca 2002 r. o ustroju miasta stołecznego Warszawy)* divided Warsaw into 18 districts (see Figure 6).

Figure 6. The 18 districts of Warsaw

Source: City of Warsaw (2010).

When we examine the overall characteristics of the city of Warsaw, we observe that residential construction sites and green areas constitute approximately 28% (145 sq km), commercial and service areas accrue about 18%, and production and agricultural areas cover around 17% of Warsaw.

The characteristics of Warsaw's residential real estate are the following:

- Approximately 11% of the Warsaw land area (about 55 sq. km) is occupied by multi-family housing estates, and over 70% of this type of housing development is located on the left side of the Vistula River. Multi-family housing is present in districts Śródmieście, Praga Północ, Praga Południe, Wola, Mokotów, Bemowo, Ursynów, and Targówek.
- Seventeen percent of the city area (approximately 90 sq. km) is dedicated to single family housing developments, which are mainly located (over 60%) on the right side of the Vistula River. Single-family housing development is concentrated mostly in the following districts: Wawer, Wesoła, Białołęka, and Wilanów.

Warsaw's residential market continues to be the most developed in Poland due to high in-migration, the highest income levels in Poland, and the lowest unemployment rate (2.8%), thus we observe that in Warsaw after 2001, 10,000-15,000 completed housing units were available. In 2008-9 completed units increased further to 18,000. However, by 2009 unit

starts were starkly curtailed, resulting in the delivery of just 10,000 units as of June, 2010 (EY The Polish Real Estate Guide, 2010).

According to CityDom24.pl, the average price of apartments in Warsaw is currently at the level of PLN 8,900/m^2 (Figure 7), with the highest unit prices observed in Śródmieście (PLN 12,100), and the lowest in the Wesoła district (PLN 6,900).

Figure 7. Average sq metre price of apartments in April, 2010 in Warsaw (information for districts)
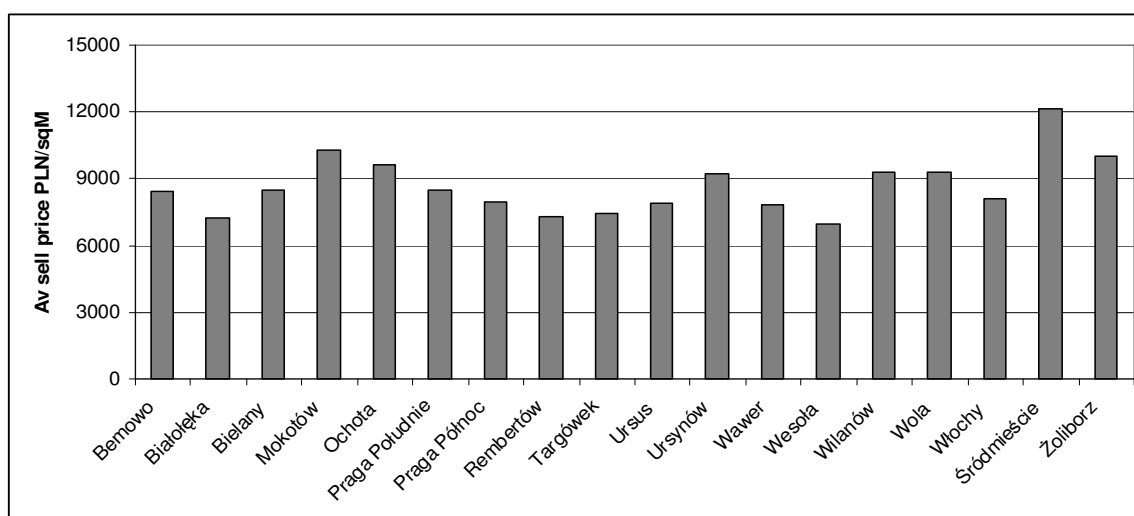
Source: CityDom24.pl

Other sectors such as commercial and service real estate account for approximately 7% of Warsaw's land area (about 36 sq. km) and 70% of retail, office and leisure space in Warsaw is situated on the left side of the Vistula River.

Transport infrastructure in Warsaw has been developed in recent years to meet the growing needs and opportunities of its citizens. The local authority is renewing the public transport modes, improving accessibility to the city centre and thus steadily increasing investment directed to public transport. Warsaw has a well developed bus and tram system, as well as suburban trains that operate between the city centre and Warsaw's hinterland.

Among the high priority strategic investments planned for the next five years are the construction of The North Bridge (*Most Północny*), reconstruction of Andersa street, further works in construction of the downtown bypass (*Obwodnica Śródmiejska)*, modernisation of Jerozolimskie boulevards (Aleje Jerozolimskie), and further works related to the planning and

construction of Warsaw's second metro line. In the city budget for 2009, PLN 3.1 billion was dedicated to all new investment projects.

In 2008 the city of Warsaw finished the construction of its first metro line (north-south), however, this first line took more than 25 years to complete. At present, the extension of the metro system (second line) is becoming a main priority for the City Council because the number of passengers using the metro system is growing year on year (Figure 8).

Figure 8. Number of passengers Warsaw Metro: 1995-2008
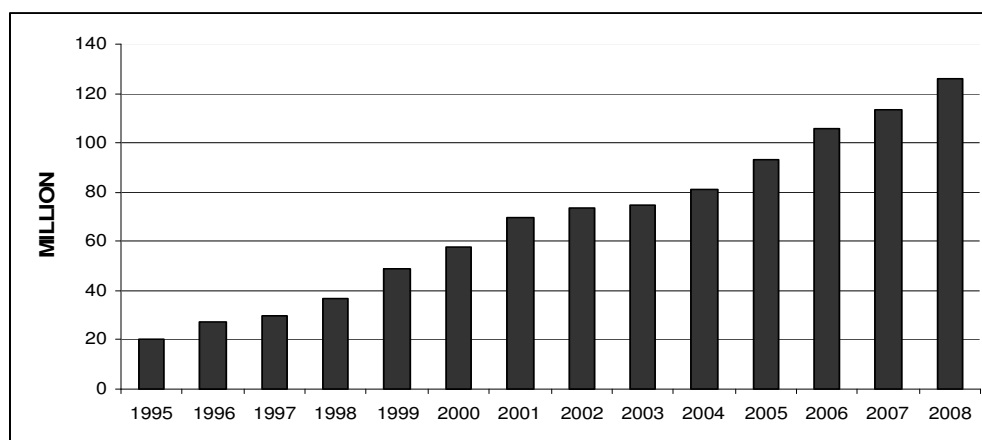
Source: Metro Warszawskie sp. z o.o.

The construction of the central section of the second metro line began in May 2010. This project has required a municipal investment equal to PLN 4.117,5 billion in conjunction with European Union funds equal to PLN 2.973 billion. The three other sections of the line have been planned and their construction will start after the completion of the first section.

The main source of finance for the first line of the metro system came from the City of Warsaw budget as well as the Polish national budget. Figure 9 depicts the allocation of the construction costs between the state and city budgets during the period 1990–2008.

Figure 9. Sources for metro construction finance
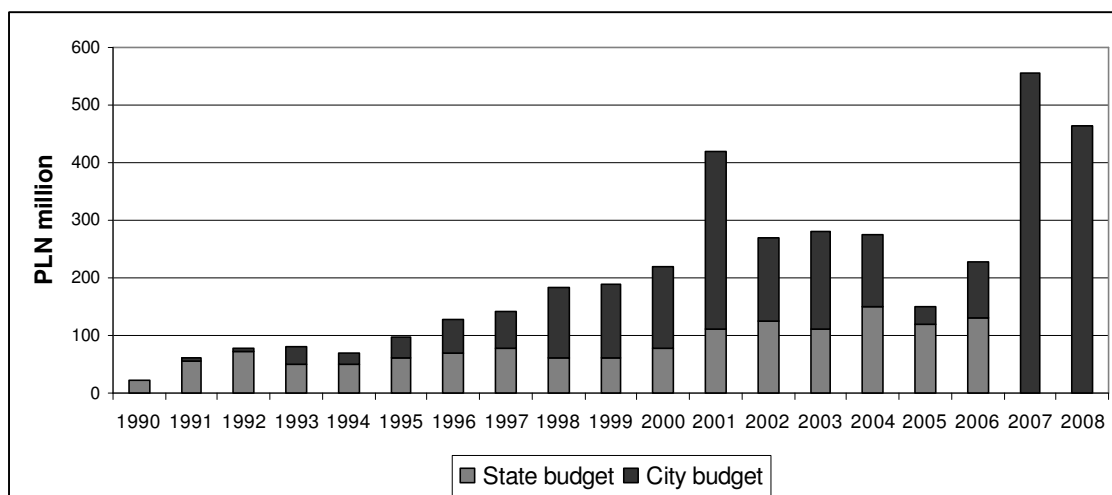
Source: Metro Warszawskie sp. z o.o.

When we examine the city council's budget closely, we observe that city revenue sources can be grouped into six main categories, as shown in Figure 10. In Table 12 we illustrate a more detailed structure of the Warsaw budget and present the revenue sources related specifically to land and property.

Figure 10. Revenue sources planned for 2010 in city budget in general distribution
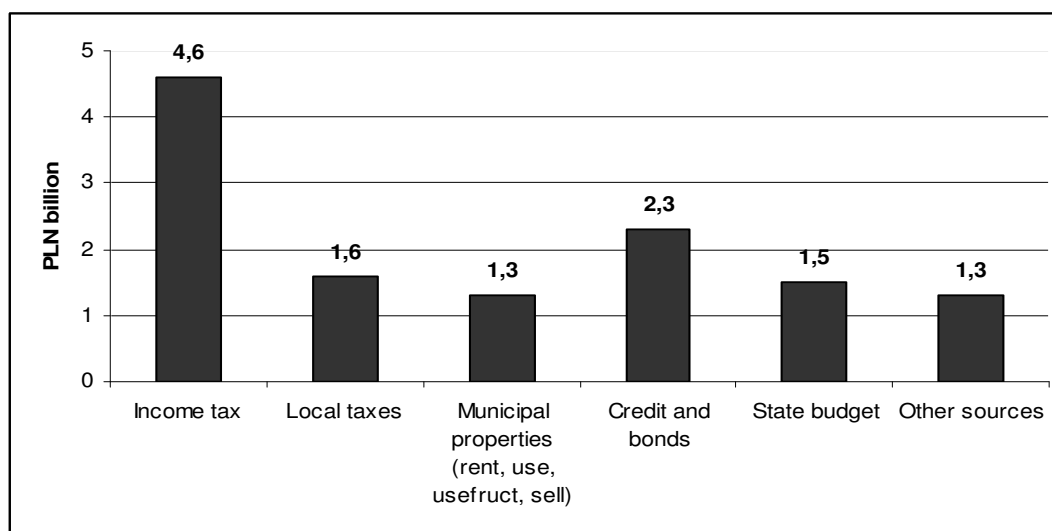
Source: The City 2010 Budget.

Table 12. Structure of revenue sources related to land and property in City Council Budget

|	Revenue source	2008	2009	2010	Dynamic change 2010/2008
		(realised)	(planned)	(planned)	(%)
1	real estate tax	767 307 390 zł	775 851 792 zł	826 283 425 zł	107,7
2	property transfer tax	68 479 416 zł	55 000 000 zł	57 185 000 zł	83,5
3	fee from lease and rent of municipal assets	453 669 385 zł	460 270 640 zł	536 291 842 zł	118,2
4	fees from management, use and usufruct of municipal assets	314 158 731 zł	292 533 379 zł	324 407 201 zł	103,3
5	dividents income from companies	24 221 694 zł	12 825 000 zł	23 500 000 zł	97
6	planning gain	2 971 100 zł	1 218 000 zł	1 356 000 zł	45,6
7	adjacency levy	711 250 zł	2 199 000 zł	1 356 000 zł	190,7
8	subsidies	1 062 955 554 zł	1 196 166 910 zł	1 242 599 220 zł	116,9
9	special purpose grants	334 089 774 zł	337 810 220 zł	316 739 033 zł	94,8
10	EU funding	310 561 038 zł	146 687 915 zł	602 502 715 zł	194
	TOTAL LAND AND PROPERTY REVENUE (1-7)	1 631 518 966 zł	1 599 897 811 zł	1 770 379 468 zł	108,5
	TOTAL BUDGET REVENUE	10 256 992 693 zł	9 544 693 666 zł	10 298 945 321 zł	100,4

Source: The City 2010 Budget.

The city spent approximately PLN 3.6 billion of its budget for transport in 2009, of which PLN 1.5 billion was allocated to finance public transport. Most of this amount was allocated for the extension of new bus routes, tram lines and the new type of ticketing system.

Despite the financial capacity of the city, there is continuous demand for new transport investment; therefore, land value finance can be seen as an opportunity to create an additional source of revenue for transport projects.

8.2   Warsaw case study: Bielany and Targówek

In this section we investigate the possibility of defining additional resources to finance the Warsaw metro extension (line 2). We select two different districts of Warsaw: Bielany, which has direct access to the metro system (completed in 2008); and Targówek where the metro line is planned; we do so in order to examine the relationship between house price and the metro system. From a first analysis, we observe in Figure 11 that the residential real estate market in Bielany and Targówek follows similar trends in comparison with the Warsaw trend, but the house market in Bielany outperforms that of Targówek.

Figure 11. Changes in real estate price for Warsaw and its two districts (2004-2008)
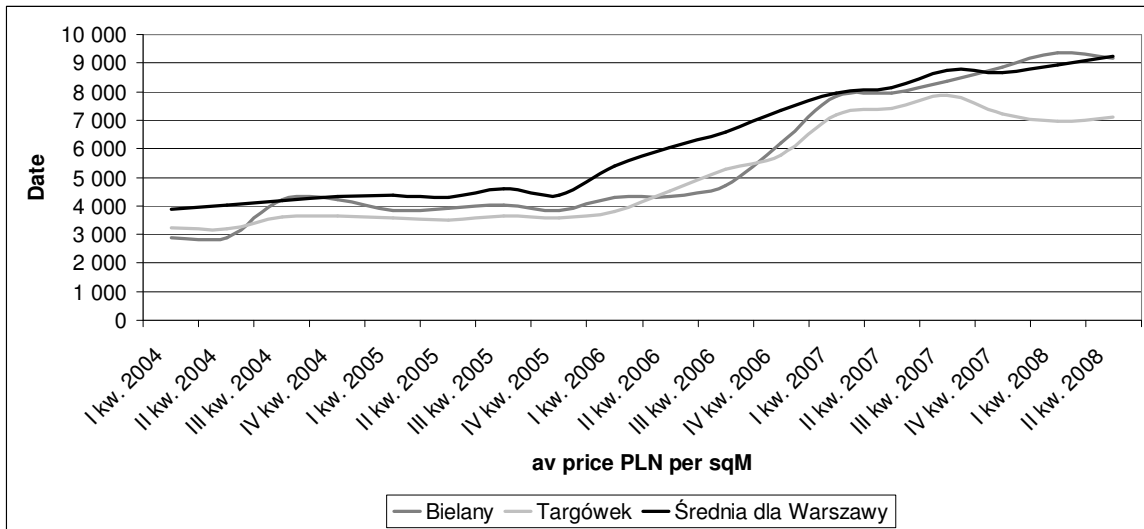
Source: RedNet Consulting.

In the following section we briefly describe the characteristics of the two districts:

Bielany is located in the north-western part of Warsaw and covers 32.3 kms^2 with a population density exceeding 4000 per square km. Bielany is a residential district with strong industrial features. The main green areas are Rezerwat Lasek Bielański and Park Młociński. Bielany is well connected to the city centre with a tram service (6 lines) and buses (23 day lines and 7 night lines) as well as metro (four stations: A-20 Słodowiec, A-21 Stare Bielany, A-22 Wawrzyszew, A-23 Młociny).

Targówek is located in the northern part of the city and, as Bielany, has both residential and industrial features. Green areas constitute about 30% of the district and are: Lasek Bródnowski, Park Bródnowski and Park Wiecha. Targówek will be served by the planned second metro line and consist of five stations: Targówek I, Targówek II, Zacisze, Kondratowicza, and Bródno. Figure X presents the location of the two districts in relation to the metro system.

Figure 12. Metro system in Warsaw with Bielany and Targówek districts highlighted in green and orange, respectively

8.3   Methodology: The Hedonic Price Model

To measure the capitalisation benefits of the metro access, we estimate the hedonic price model. The hedonic price model is a standard methodology to assess the financial viability and impacts of public projects, and may be applied for example, to the construction of a metro system, new sport stadium, or airport development (Tu, 2005; McMillen, 2004; Morancho, 2003; Lin 2004). At the base of this method we assume that consumer goods comprise a bundle of attributes and that the transaction price can be decomposed into the component (or 'hedonic') price of each attribute (Rosen, 1974). Our hypothesis in the

econometric analysis is that house prices in the Bielany district decrease as we move farther away from the metro station. For the Targówek district, given the similar characteristics and trends in the real estate market of the two districts, we estimate the house price in Targówek district by using a two-tiered econometric analysis. We consider the result of the evaluation of the Bielany transport accessibility because our aim is to evaluate the impact of the future metro system on house price in the Targówek district.

The explanatory variables in our hedonic model are divided into two groups: variables characterising the residential type and variables characterising the location type. The first group contains data on age of building, number of rooms, floor level, year of sale of property, usable area, and information about garage. Whereas the second group of variables which describe the location characteristics are: proximity to school, access to green area, hospital, access to metro system (Table 13).

Table 13. The variables in the hedonic model.

VARIABLE	DESCRIPTION	VALUE
P	: transaction price of property	price in PLN
T	: year of sale of property (Trend)	"T" takes values form 1 to 5, 1 for 2006, 2 for 2007 etc.
X1	: usable area of flat	square metres
X2	: rooms in flat	number
X3	: floor level	number; 1 for ground floor, 2 for first floor etc.
X4	: year of construction	date
D1	: access to school	dummy variable with value 1 when distance to school is less than 1 km, 0 when access is more than 1 km
D2	: access to health care facility	dummy variable with value 1 when distance to health care facility is less than 1 km, 0 when access is more than 1 km
D3	: access to green area	dummy variable with value 1 when distance to green area is less than 1 km, 0 when access is more than 1 km
D4	: garage	dummy variable with value 1 for available parking place, 0 for lack of parking place
D5	: access to metro	dummy variable with value 1 when there is distance to metro station less than 1 km, 0 when distance is more than 1 km
ε	: error	captures unobserved determinants of housing prices

Multiple linear regression function was performed for each area (Bielany and Targówek) in order to study the correlations between house price and the explanatory variables and in particular the *access to metro* variable. For the Bielany district, with access to the metro line, equation (1) is a follows:

$$lnP_u(X_i, D_i) = \alpha + \beta_1 T + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 D_1 + \beta_7 D_2 + \beta_8 D_3 + \beta_9 D_4 + \beta_{10} D_5 + \varepsilon \qquad (1)$$

For the Targówek district, where the metro extension is planned, we estimate two regression analyses. In equation (2) we demonstrate the relationship between house price and the explanatory variables, in equation (3) we take into consideration the beta value from the calculation of the Bielany district (β_{10}) in order to estimate how the presence of the new metro line (line 2 extension) is capitalised in the house price of Targówek district.

$$lnP_{nu}(X_i, D_i) = \alpha + \beta_1 T + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 D_1 + \beta_7 D_2 + \beta_8 D_3 + \beta_9 D_4 + \varepsilon \qquad (2)$$

$$lnP_{nu}(X_i, D_i) = \alpha + \beta_1 T + \beta_2 X_1 + \beta_3 X_2 + \beta_4 X_3 + \beta_5 X_4 + \beta_6 D_1 + \beta_7 D_2 + \beta_8 D_3 + \beta_9 D_4 + \beta_{10} D_5 + \varepsilon \qquad (3)$$

The data for our estimation on housing transactions comes from the AMRON database for the period 2006-2010, and contains sales prices and a range of property descriptors (usable area, number of bedrooms, floor level, etc.), and street name. For each apartment we calculate the distance, as the crow flies, to the metro station and identify it as a dummy variable (1 if property is within 1 km to station, 0 if distance to station exceeds 1 km). The same procedure applies for access to school, green area, and hospital/ clinic variables. The dataset is comprised of 1130 real estate transactions along the existing and planned metro lines (line 1 and extension line 2).

8.4   *Empirical Results*

The hedonic price equations were estimated with ordinary least squares regressions (OLS) (Appendix 1, Tables A and B). The dependent variable is the house price, which is expressed in logarithm form in order to address the problem of heteroskedasticity prevalent with housing data. The variables X_i are house characteristics, whereas variables D_i are the location characteristics, expressed as dummy variables.

In the analysis for the Bielany district (Table 14), all the independent variables are statistically significant ($P < 0,05$) except for the trend, number of rooms, and proximity to green area variables. The data shows that house prices increase with the increase in accessibility to the

metro system. In the case of Bielany, the coefficient of the *access to metro* variable is equal to 0,067. In other words, houses located within a distance of 1 km from the nearest metro station have a 6.7% higher selling price than houses in the same district but farther away. A positive correlation with house price is also found in relation to garage space (7,1%), but we find a negative correlation in relation to proximity to school (6,9%) and hospital/ clinic (8,3%).

Table 14. The Bielany district

Model	Unstandardised Coefficients		Standardised Coefficients		
	Parameter estimate (B)	Std. Error	Beta	t	Sig.
(Constant)	8,215	0,903		9,098	0,000
Trend	-0,016	0,011	-0,028	-1,434	0,152
X1: Usable area	0,016	0,001	0,773	21,956	0,000
X2: Rooms	0,022	0,015	0,049	1,432	0,153
X3: Floor	-0,007	0,003	-0,047	-2,309	0,021
X4: Year of construction	0,002	0	0,095	4,158	0,000
D1: School	-0,069	0,018	-0,081	-3,876	0,000
D2: Hospital/ clinic	-0,083	0,022	-0,088	-3,694	0,000
D3: Green area	-0,014	0,019	-0,017	-0,752	0,452
D4: Garage	0,071	0,019	0,075	3,646	0,000
D5: Access to Metro	0,067	0,019	0,080	3,607	0,000

In the case of Targówek (Table 15) in the first model we estimate the OLS regression without the variable *access to metro*. Results for this model are statistically significant for usable area, number of rooms and year of construction, that is, they increase house prices by 1,3%, 5,8% and 0,7%, respectively.

Table 15. The Targówek district

Model	Unstandardised Coefficients		Standardised Coefficients		
	Parameter estimate (B)	Std. Error	Beta	t	Sig.
(Constant)	-2,279	1,234		-1,847	0,065
Trend	-0,029	0,01	-0,062	-2,743	0,006
X1: Usable area	0,013	0,001	0,649	18,412	0,000
X2: Rooms	0,058	0,014	0,133	4,041	0,000
X3: Floor	0,000	0,003	-0,004	-0,204	0,838
X4: Year of construction	0,007	0,001	0,306	11,463	0,000
D1: School	0,003	0,017	0,004	0,167	0,868
D2: Hospital/ clinic	0,013	0,03	0,01	0,435	0,668
D3: Green area	-0,024	0,017	-0,032	-1,395	0,164
D4: Garage	0,022	0,019	0,027	1,183	0,237

In the second analysis we estimate the impact of the metro system extension on the house price in Targówek. Given the similarity of the two districts (Targówek and Bielany), we calculate the value of house price in Targówek by introducing in the regression the Bielany coefficient for *access to metro*. By subtracting the estimated house price with the actual house price, we obtain the estimation of the increase in price due to the extension of metro line 2. In the case of Targówek, houses located within 1 km from one of the planned stations (of the line 2 extension) will achieve a price that is 7.13% higher than other houses located in other parts of the same district. We can conclude in both cases that the presence of transport infrastructure (i.e., the metro system) has a positive impact on house price, and thus represents a potentially significant return on the transport investment.

9.   Recommendations: Land Value Capture for Poland

Since the early 1990s, many attempts have been made in countries such as Poland to mobilise innovative funding sources to support urban investment, but mainly these financial sources are based on public funds – both national and European. The application of PPP models such as BOT encounters many barriers and statutory obstacles that hinder the realisation of such partnerships between the public and private sector. Therefore, one first step to be undertaken by the public sector is to consider a variety of options: tools, instruments and methodologies which would be the most appropriate for the city and the investment. From this perspective we need to recognise the difficulty in establishing a standardised model of land value capture that can be replicated across various urban contexts.

After having reviewed in the previous sections the contextual situation of the fiscal system in Poland, we can observe that a key element in Polish fiscal reform is the decentralisation process of the fiscal system in order to link tax revenue to different levels of government. Fiscal decentralisation is based on the subsidiarity principle that places municipal autonomy and authority in close proximity to citizens' needs and expectations. Within this element of the fiscal reform the principles and practices of land value capture can be implemented in Poland, because the revenue generated by land value capture can be earmarked in order to fund urban expenditure.

However, at present, Polish municipalities have limited fiscal revenue autonomy, and this certainly affects the implementation of land value mechanisms. We have noticed that the amount of the generated revenues by non-recurrent taxes on property, which are in line with the land value capture concept, should be specified in order to be effective, that is, to accrue

approximately 5% of the total local revenue. Moreover, the piecemeal approach to property tax reform suggests that local government in Poland needs possible financial incentives to bypass the legislative oversight and design customised tax disciplines directed towards urban investment.

Given the results of our analysis of the two districts, we can now consider the different alternatives of how the land value financing mechanisms may be suitable for the Warsaw case. We review three options:

- The implementation of a land tax mechanism to capture the increase of property value within the existing legal and planning framework in Poland will require a highly advanced land registry and new land evaluation system. This option may be a cumbersome one for the following reasons. The construction of a price index is necessary in order to establish a correct land tax because we need to have an adjustment of the real estate market over time, however, this will require access to complete and accurate datasets (Łaszek and Widłak, 2008). Another drawback is due to the fact that the Polish tax administration still suffers from the inheritance of an under-developed administrative practice, particularly in the enforcement feasibility and the lack of revenue autonomy at regional and local levels. This implies that the costs for the administrative and legislative implementation may exceed the accrued revenue acquired through the land value capture tax. Nonetheless, the implementation of a land tax mechanism may be seen as the best choice over the long-term, but in order to do so, the main implementation for the land administration authority is to define a legal and planning system able to capture land tax efficiently and effectively.

- A second option for the implementation of land value capture in Poland which, accordingly, needs a separate and detailed study, could be to apply a form of betterment levy to commercial property in Warsaw that would be earmarked for the transport investment. Various cities around the world have followed this type of approach. In London for example, the Crossrail infrastructure is partly financed through a dedicated tax: the Business Rate Supplement (BRS). The Crossrail BRS is applied only to business premises in the 32 London boroughs and the City of London that have a rateable value of £55,000 or more. The Crossrail BRS multiplier for 2010-11 is 2p to the pound, and for the 2010-11 financial year, it is expected that BRS will finance £4.1 billion of the costs of the £15.9 billion Crossrail project. Another application of the betterment levy is given by the Metropolitan Atlanta Rapid Transit

Authority (MARTA), the rapid-transit system in Atlanta, Georgia, USA. The system is funded primarily by passenger revenues, and a 1% sales tax is levied in MARTA's service area (Fulton and DeKalb counties). By law, funds from the 1% sales tax must be split evenly between MARTA's operational and capital expenditure budgets; Atlanta expects to raise as much as $790 million by the end of 2011.

- A third option for the implementation of land value, which is likely to be the most suitable application for the current Polish economic situation, is the public private partnership (PPP). According to Medda, "the main potential benefit of the PPP approach, with the introduction of the land value capture mechanism in transport investment, is its flexibility in adapting the structure of incentives and risk-sharing to the features of the project and to the economic and institutional environment" (Medda, 2009). To set the stage for capturing the increase in value through PPP contracts, the relationship between private and public sector must be based on a clear understanding of the benefits realised with new investments, and these should be provided as evidence in the financial arrangements. Given the future infrastructure investments that Poland will need to undertake (e.g., Poland has been elected as a co-host nation for the 2012 UEFA European Football Championships), the Polish government has passed a new PPP legislative structure (2009) which replaces the PPP Act of 2005. The new law contains a number of specific provisions for the private sector as for example, less formal procedures and pre-emption rights, but does not refer to tax incentives. The PPP Act of 2009, however, encourages and facilitates the intervention of the private sector in public sector investment, and thus it can be seen as the legal basis for introducing in the contractual agreement the financial benefits accrued from the investment due to the increase in land value. For instance, if the private sector is given the right of construction on top of a metro station or has commercial activity in the station, then the public sector will need to introduce in the contract the increase in value that this real estate will gain due to the presence of the transport infrastructure.

10. Conclusions

In the literature we observe that in-depth analyses of land value capture (tax, incentives, development agreements) in Central and Eastern European countries are scant compared to the rest of the world. Our aim in this report was to fill this gap.

In the face of major infrastructure needs, the introduction of land value capture finance mechanisms in investment programmes for urban public transport may be one of the most important steps in urban policy in Poland. Urban infrastructure investment plays a pivotal role in enhancing the productivity and quality of life in cities. In Central and Eastern European countries such as Poland, accessing sufficient revenue sources in a timely manner is crucial for the development of urban infrastructure. However, city governments often have difficulty finding proper solutions and efficient ways of financing urban infrastructure; it is within this context that land value capture may be considered as a stimulating and innovative challenge for policy makers. To be effective and successful, however, land value capture needs to be accompanied by structural fiscal reform throughout the economy. In particular, reform in the areas of local fiscal taxation, such as property tax and decentralisation, have proven to be significant. Local governments should therefore become more knowledgeable about the advantages arising from innovative financial solutions and new forms of customised tax revenue.

In this report we have analysed the economic impacts of the Warsaw metro system on the housing market. The metro accessibility on residential properties (house price) in the two districts of Targówek and Bielany indicate the possible value increment to be expected in the Targówek district when the metro extension is constructed. This increment represents the value creation that the metro investment will determine that can be recaptured by the public authority as part of the financial portfolio to help pay for the infrastructure. Captured revenue from increased house prices could indeed be a significant source of income for the Warsaw local government.

Certainly if our aim was to analyse the real estate financial impact of the extension of line 2 in Warsaw, we should have also considered the commercial activity: since the capitalisation of commercial property is generally greater than that of the housing market, and thus we would have estimated a higher level of profitability related to the project. However, in this study we deliberately chose to examine the potential of land value capture finance with a cautious and realistic approach because of the current global economic crisis and consequent private sector constraints on financial leveraging. For this reason we have focused on the housing market.

We have reviewed three possible options for the implementation of land value finance in Poland and we have concluded that the most suitable application is the Public and Private Partnership (PPP). In order to introduce the land value mechanism into the PPP arrangement, however, it is necessary to understand the profitability of the transport system in its specific context (what city and what investment is being considered) and in relation to the property market. No standardised model of land value capture mechanism can be easily replicated across cities and across countries, since the contextual element determines the project realisation, and this is clearly a fundamental point when we examine the Warsaw case. We have observed in our case that the Polish government and Warsaw's local authority influence the pattern of urban development, not only through taxation, financial policy and the provision of infrastructure, but also through planning and regulatory controls over how land is used. For this reason, the success of public strategic infrastructure investments, such as the extension of the Warsaw metro line, need fair, efficient and stable funding mechanisms of which land value finance represents a significant and direct contribution.

References

Andelson, R.V. (2000). *Land-value taxation around the world*, Malden, MA: Blackwell.

Bajic V. (1983). *The Effects of a New Subway Line on Housing Prices in Metropolitan Toronto*, Urban Studies, 20: 147-158.

Balchin, P.N. and Kieve, J.L. (1985). *Urban Land Economics*, 3rd edition, London, Macmillan.

Bartik, T.J., Smith, V.K. (1987). *Urban amenities and public policy*, [in:] E.S. Mills (ed.), *Handbook of Regional and Urban Economics,* vol. II, North Holland, Amsterdam.

Benjamin, J.D. Sirmans, S.G. (1996). *Mass transportation, apartment rent and property values*, Journal of Real Estate Research, 12, 1-8.

Bindebir, S. (2004). *Intergovernmental Finance and Local Government System in Turkey: Experiences and Lessons to be Learned from Poland*, Ecomod 2004 - International Conference on Policy Modeling.

Bowes, D.R. Ihlanfeldt, K.R., (2001). *Economic Impact Analysis of Transit Investments: Guidebook for Practitioners*, TRB Report 35, Transit Cooperative Research Program, Transportation Research Board.

British Property Federation (2008). *Tax Increment Financing: a new tool for funding regeneration in the UK?*

Cervero, R. (2002). *Benefits of Proximity to Rail on Housing Markets: Experiences in Santa Clara County*, Journal of Public Transportation, Vol. 5, No. 1.

Chapman, J.I., Cornia, G.C., Facer, R.L., Walters, L.C. (2009). *Alternative Financing Models for Transportation: A Case Study of Land Taxation in Utah*, Public Works Management & Policy, Vol. 13, No. 3.

Chiaki, K., Winston, B.P., Kimura K., Rose C., (2000). *Study on Urban Transport Development*. Technical report The World Bank.

Council of Europe (1992). *Decentralisation and the strengthening of local self-government*, Local and regional authorities in Europe, No. 48.

Council of Europe (1998). *The size of municipalities, efficiency and citizen participation*, Local and regional authorities in Europe, No. 56.

de Serres, A. (2008). *Reforming the Polish tax system to improve its efficiency*, Economic Department Working Paper No. 630, OECD.

Dewees, D.N. (1976). *The effect of a subway on residential property values in Toronto*, Journal of Urban Economics, 3, 357-369.

Doherty, M. (2005). *Funding Public Transport Development through Land Value Capture Programs*, Ecotransit website.

Dye, R.F., Sundberg, J.O. (1998). *A Model of Tax Increment Financing Adoption Incentives*, Growth and Change 29 (1), pp. 90–110.

Farrell, S., Tsukada, S., Kurawami, C. (1994). *Value Capture: The Japanese Experience*, Technical Report, Financing Transport Infrastructure.

Fensham, P., Gleeson, B. (2003). *Capturing Value for Urban Management: A New Agenda for Betterment*, Urban Policy and Research, 21: 1, 93-112.

Gatzlaff, D., Smith, M. (1993). *The impact of the Miami Metrorail on the value of residences near station location*, Land Economics, 69, 54-66.

Hall, P. and Marshall, S. (2000). *Report on Transport and Land Use/Development for Independent Transport Commission*, London: University College London.

Higginson, M. (1999). *Alternative Sources of Funding*, Public Transport International 48.

Hong, Y.H., Alven, H.S.L. (1998). *Opportunities and Risks of Capturing Land Values under Hong Kong's Leasehold System*, Technical report Lincoln Institute of Land Policy.

Huxley, J. (2009). *Value Capture Finance. Making urban development pay its way*, Urban Land Institute.

Ihlanfeldt, K.R., Raper, M.D. (1990). *The Intra-metropolitian Location of New Office Firms*, Land Economics, 66, 182-198.

Industry Commission, (1993), *Taxation and Financial Policy Impacts on Urban Settlement*, Report No. 30, Australian Government Publishing Service, Canberra.

Izdebski, H., Nielicki, A., Zachariasz I. (2007). *Zagospodarowanie przestrzenne. Polskie prawo na tle standardów demokratycznego państwa prawnego*, Ernst&Young Sprawne Państwo, Warszawa.

Kennedy, C., Miller, E., Shalaby, A., Maclean, H., and Coleman, J. (2005) *The Four Pillars of Sustainable Urban Transportation,* Transport Reviews 25 (4), pp. 393-414.

Kierzenkowski, R. (2008). *The Challenge of Rapidly Improving Transport Infrastructure in Poland*, OECD Economics Department Working Papers, No. 640, OECD.

Kumar, R. (2001). *A long road to potential riches*, Australian Financial Review.

Lakshmanan, T.R. (2010). *The broader economic consequences of transport infrastructure investments*, Journal of Transport Geography.

Landis, J., Guhathakurta, S., Zhang, M. (1995). *Rail Transit Investments, Real Estate Values, and Land Use Change: A Comparative Analysis of Five California Transit Systems*, Institute of Urban and Regional Development, University of California at Berkeley.

Landis, J., Cervero, R., Hall, P. (1991). *Transit joint development in the USA: an inventory and policy assessment*, Environment and Planning C: Government and Policy 9(4) 431-452.

Łaszek, J., Widłak M. (2008). *Badanie cen na rynku mieszkań prywatnych zamieszkałych przez właściciela z perspektywy banku centralnego*, Bank i Kredyt.

Lerman, S.R., Damm, D., Lerner-Lamm, E., Young, J. (1978). *The Effect of the Washington Metro on Urban Property Values*, Urban Mass Transit Administration, U.S. Department of Transportation.

Lin, J.J., Hwang C.H. (2004). *Analysis of property prices before and after the opening of the Taipei subway system*, The Annal of Regional Science (2004) 38: 687–704.

Malme, J.H., Youngman, J.M. (2001). *The development of property taxation in economies in transition: case studies from Central and Eastern Europe*, Washington, D.C., World Bank.

McMillen, D.P. (2004). *Airport expansions and property values: The case of Chicago O'Hare Airport*, Journal of Urban Economics 55.

Meakin, R.T. (1990). *Hong Kong's Mass Transit Railway* [in:] *Rail Mass Transit For Developing Countries*, Institution of Civil Engineers.

Medda, F.R. (2008). *Land Value Mechanism in Transport PPPs: Investment in Urban Mass Transit Systems*, World Bank.

Medda, F.R. (2009). *Land Value Tax as an Investment Mechanism for Public Transport Assets*, [in:] *Financing affordable housing and infrastructure in cities: towards innovative land and property taxation system*, Conference Report, UN-Habitat, GLTN.

Morancho, A.B., (2003). *A hedonic valuation of urban green area*, Landscape and Urban Planning 66.

Nam, C.W., Porsche, R. (2001). *Municipal finance in Poland, the Slovak Republic, the Czech Republic and Hungary: Institutional framework and recent development*, Kluwer Academic Publisher, the Netherlands.

Nelson, A.C. (1992). *Effects of Elevated Heavy-Rail Transit Stations on House Prices with Respect to Neighborhood Income*. Transportation Research Record, 1359: p. 127-132.

Nelson, A.C., Duncan, J.B. (1995). *Growth Management Principles and Practices.* Planner Press, Chicago, IL.

Oulasvirta, L., Turała, M. (2009). *Financial autonomy and consistency of central government policy towards local governments*, International Review of Administrative Sciences.

REAS, Jones Lang LaSalle (2010). *Residential Markets in Central European Capitals*, Warsaw.

Regulski, J. (2003). *Local government reform in Poland: an insider's story*, Local Government and Public Service Reform Initiative/ Open Society Institute, Budapest.

Report *Transportation for Tomorrow* (2007), National Surface Transportation Policy and Revenue Study Commission.

Ridley, T.M., Fawkner, J. (1987). *Benefit sharing: the funding of urban transport through contributions from external beneficiaries*, Report from the 47th Congress, International Union of Public Transport, Lausanne.

Riley, D. (2001). *Taken for a Ride: Transit, Taxpayers, and the Treasury*, Centre for Land Policy Studies, UK.

Rosen, S. (1974). *Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition*, Journal of Political Economy 82: 34-55.

Sheppard, S. (1999). *Hedonic analysis of housing markets*, [in:] P. C. Cheshire and E. S. Mills (eds.), *Handbook of Regional and Urban Economics*, vol. 3, Amsterdam: Elsevier Science.

Smersh, G., Smith, M. (2000). *Accessibility Changes and Urban House Price. Appreciation: A Constrained Optimization. Approach to Determining Distance Effects*, Journal of Housing Economics 9.

Smith, J.J., Gihring T.A. (2006). *Financing Transit Systems Through Value Capture*, American Journal of Economics and Sociology, Vol. 65, No. 3.

Swianiewicz, P. et al. (2001). *Public Perception of Local Governments, Local Government and Public Service Reform Initiative*, Open Society Institute Budapest.

Swianiewicz, P. (2002). *Reforming Local Government in Poland: Top-Down and Bottom-Up Processes*.

Swianiewicz, P. (2003). *Foundation of fiscal decentralization. Benchmarking guide for countries in transition*, Local Government and Public Service Reform Initiative/ Open Society Institute, Budapest.

Swianiewicz, P. (2003). *Local Taxes in Poland. Base for Local Accountability?* NISP Acee Annual Conference, Bucarest.

The Polish Real Estate Guide (2010). *Poland: The real state of real estate,* Ernst&Young.

Tu, C.C. (2005). *How does a new sport stadium affect housing values? The case of FedEx Field*, Land Economics 81 (3): 379-395.

Wetzel, D. (2006). *Innovative Ways of Financing Public Transport*, World Transport Policy and Practice 12 (1), pp. 40-6.

WMATA (Washington Metropolitan Area Transit Authority), (2008). *Joint Development Policies and Guidelines*, Technical report Washington Metropolitan Area Transit Authority.

Workman, S.L., Brod, D. (1997). *Measuring the neighborhood benefits of rail transit accessibility*, Transportation Research Record, 1576, 147-153.

Wrigley, M., Wyatt, P. (2001). *The Cutting Edge 2001. Transport Policy and Property Values*, RICS Foundation.

Table A. *The regression analysis for Bielany district (Model 1)*

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	83,02	10	8,302	205,266	,000[a]
	Residual	25,238	624	,040		
	Total	108,257	634			

a. Predictors: (Constant), Access to Metro, Trend, Rooms, Green area, Floor, Garage, School, Year of construction, Hospital/clinic, Usable area

b. Dependent Variable expressed in natural logarithm

Table B. *The regression analysis for Targówek district (Model 2)*

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	49,976	9	5,553	188,490	,000[a]
	Residual	14,200	482	,029		
	Total	64,176	491			

a. Predictors: (Constant), Trend, Rooms, Green area, Floor, Garage, School, Year of construction, Hospital/clinic, Usable area

b. Dependent Variable expressed in natural logarithm

Table C. *Correlation matrix for variables of all variables for Bielany district*

	In	Trend	X1: Usable area	X2: Rooms	X3: Floor	X4: Year of construction	D1: School	D2: Hospital/ clinic	D3: Green area	D4: Garage	D5: Access to Metro
In	1										
Trend	-0,099	1									
X1: Usable area	0,860	-0,091	1								
X2: Rooms	0,697	-0,097	0,809	1							
X3: Floor	-0,050	-0,052	-0,016	-0,029	1						
X4: Year of construction	0,367	-0,020	0,350	0,208	0,212	1					
D1: School	-0,201	0,051	-0,156	-0,067	-0,092	-0,218	1				
D2: Hospital/ clinic	-0,214	0,021	-0,158	-0,140	-0,028	-0,231	-0,012	1			
D3: Green area	-0,088	-0,024	-0,049	0,003	0,041	-0,122	0,025	0,495	1		
D4: Garage	-0,064	0,108	-0,136	-0,191	-0,048	-0,210	-0,014	0,077	0,151	1	
D5: Access to Metro	-0,05	0,021	-0,076	-0,046	-0,204	-0,293	0,277	0,328	0,177	0,058	1

Table D. *Correlation matrix for variables of all variables for Targówek district*

	In	Trend	X1: Usable area	X2: Rooms	X3: Floor	X4: Year of construction	D1: School	D2: Hospital/ clinic	D3: Green area	D4: Garage
In	1									
Trend	,013	1								
X1: Usable area	,844	,039	1							
X2: Rooms	,540	,002	,688	1						
X3: Floor	-,064	,100	-,067	-,078	1					
X4: Year of construction	,521	,138	,362	-,032	,007	1				
D1: School	-,186	-,018	-,159	,039	,090	-,308	1			
D2: Hospital/ clinic	-,095	,054	-,084	,064	-,018	-,202	,133	1		
D3: Green area	,056	,011	,049	-,064	,130	,213	,019	-,203	1	
D4: Garage	-,025	,272	-,074	-,076	,089	,085	,038	-,002	,080	1