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Public Value Capture in Connection with Large Infrastructure Projects

Abstract

Public value capture (PVC) is an essential phenomenon to improve the refinancing of public infrastructure and keep the necessary budget for other important duties like education, health and social care. An important but little explored aspect is public value capture in connection with large infrastructure projects such as major transport infrastructure.

International best practices have indicated that governments typically employ recurring tax- and fee-based mechanisms. However, non-recurring forms became more and more important over the past 20 years and contract-based value capture are among the most evolved value capture techniques available today.

All instruments presented in this article require data for the calculation of payments. Unfortunately, it is not possible to give general numbers for the impact of new infrastructure. An individual analysis is required for each development.

The tools presented share the idea that those who have an advantage from the new infrastructure should be targeted for funding. However, the rational is different in detail. In general, there are several well established non-recurring tools for funding the project, if the public sector owns the land or the public sector can offer development rights in exchange for financial contributions of the developers.

1. Introduction

Developing infrastructure is generally not a stand-alone project but part of the creation of new economic corridors that will deliver transformational urban regeneration (Asian Development Bank, 2021). A lack of public transport accessibility impacts primarily on the urban poor, who tend to live on the urban peripheries. The reason is the heavy reliance on the automobile as the main transport mode while poorer population groups cannot afford it. (Romana Medda, 2011).

The shortage of financial resources is a Europe-wide problem. Countries as well as regions and municipalities have decreasing means to fulfil all their public commitments. Important reasons for this are global crises such as the financial crisis, the Covid19 epidemic and the inflation, as well as European crises such as the wave of refugees, the Brexit and the war in

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Ukraine. Modernising the governance is a way to relieve economic and budgetary pressures, to design and deliver needed structural reforms, to remove existing barriers and to foster innovations. Public value capture (PVC) is an essential phenomenon to improve the refinancing of public infrastructure and keep the necessary budget for other important duties like education, health and social care. For this reason, it is one of the key factors of responsible land management and smart tools are needed for a successful implementation (Hendricks 2020). The interest in this topic has recently grown exponentially among scholars and practitioners (Vejchodska et al. 2022). In current literature, a wide agreement exists on capturing value from infrastructure improvements and public services. An important but little explored aspect is PVC in connection with large infrastructure projects such as major transport infrastructure. For this reason, this paper aims to extend the research in this area. The starting point will be a systematic literature analysis to discuss existing tools for this issue.

"Unearned increment" is internationally used for any rise in land values whether due to public decisions or to the general economy, instead of landowners' own initiatives and efforts. The term "unearned" helps to justify the process and provides a rationale for the introduction of value capture instruments (Alterman 2012). "Land value capture" (LVC) is a commonly used term. This term refers to a policy approach that enables communities to recover and reinvest land value increases resulting from public investment and other government actions. Also known as "value sharing", it is rooted in the notion that public action should generate public benefit (Land Portal 2020). In general, PVC includes land value capture and more and the term is used in a more comprehensive way. In our paper, we will share the following definition of Hendricks et al. (2022):

"The term of public value capture includes all instruments that capture all possible increases of the value of land and buildings, whether they are considered as taxes or not. It focuses primarily on capturing unearned benefits resulting from actions other than the landowner's. The resulting funds may be earmarked for specific purposes (e.g. recovery of development costs or provision of affordable housing)".

In the literature different classifications of value capture can be found, based on its purpose or its outcome. In this paper, we share the view of Hendricks (2022). We distinguish basically between recurring and non-recurring forms of PVC.

2. Methodology

In this theoretical research, the tools for PVC in connection with large infrastructure projects are examined in the form of a discursive literature analysis. The available literature on the mentioned issue is systematically summarised and presented in a new, generalising way. This is not a purely additive or synoptic presentation of the results, but the scientific added value results from the synthesis of different sources. To this end, the available material was first collected, then subjected to an assessment of quality and relevance and finally brought together in a synthesis (Lueginger and Renger 2013). The literature analysis covers the most

authoritative publications on the subject, in the past twenty years. Publications from both open access and non-open access platforms were reviewed. In addition, the literature analysis also reveals the need for further research.

3. PVC/LVC in connection with large infrastructure projects

PVC can be used as a tool to finance capital intensive infrastructure projects without additional traditional taxes or fees and related public opposition. Values which can be captured may include not only direct revenues from incremental land value increase, but long-term revenues from further development in the area. PVC is not only considered as a financial instrument, but also as a planning and policy instrument to promote economic competitiveness, environmental sustainability and social equity (Suzuki et al., 2015).

PVC tools most suited to finance large infrastructure projects can be classified into recurring and non-recurring tools.

Recurring tools include:

- Special Assessment, Business Improvement or Community Benefit districts;
- Tax Increment Financing;
- Location Benefit Levy or Land Value Tax with additional transit component;
- Transportation Utility Fee;
- Income or Payroll Based Tax;
- Transit focused Property Transactions Tax.

Non-recurring tools include:

- Development Agreement, Development Contribution or Planning Gain;
- Community Benefits Agreement;
- Joint Development or Joint Development Agreement;
- Sale/lease of Development/Air rights or Up Zoning/Density Bonuses/FAR;
- Transit-focused Development Fee;
- Land Readjustment Scheme.

The tools are explained in more detail below.

3.1 Recurring PVC tools

Special Assessment, *Business Improvement* or *Community Benefit Districts* are specifically designated districts, which benefit from an improvement, and which may choose to self-impose an additional tax to help finance the improvement. These special assessments are generally approved through some form of vote by the group that will be paying the tax. This group could be local landowners, local residents, or local businesses. The taxes are usually meant to finance a portion of the local infrastructure investment rather than to subsidize the system operating costs (Salon, 2014; Arroyo, 2020).

The Washington Metropolitan Area Transit Authority raised a substantial portion of the capital costs for two infrastructure projects using Special Assessment Districts (Salon, 2014). In London, the South Bank Employers' Group, a partnership of 18 major employers in the area, created the Business Improvement District to help regenerate the area, improve visitor experiences, and diversify both its uses and its revenue streams. On the other hand, an example of a Community Benefit District is Yerba Buena is San Francisco, USA (Arroyo, 2020).

Tax Increment Financing (TIF) uses anticipated future increase in tax revenues to finance current improvements that are expected to generate those increased revenues (Arroyo, 2020). It is essentially a surtax on properties within an area to be redeveloped by public investment financed by municipal bonds (Suzuki et al., 2015). The city of Chicago in the US, Transport for London, the city of Toronto, Canada and Belo Horizonte, Brazil are all examples where TIFs have been used to finance transport projects (Martinez, 2010).

Location Benefit Levy or Land Value Tax with additional transit component are taxes on the value of land in the vicinity of a public transport amenity. This mechanism is a tax on the land only, and this is distinct from a conventional property tax (Salon, 2014; Martinez, 2010). In London, this tax is called the "Business Rate Supplement", and is collected on all existing commercial buildings that rent for more than £55,000 per year in the Greater London area (Salon, 2014).

In the US transit-focused property transaction taxes can also be charged. New York City collects the Mortgage Recording Tax when properties are sold. The collection rate fluctuates with the real estate market, but in 2012, this tax raised slightly less than $300 million for the transit agency (Salon, 2014).

The *Transportation Utility Fee* (TUF) is a tax based on the principle that links the benefits of operation of a transportation system to existing activities. Each type of activity is generally levied based on its trip generation rate, leading to a higher tax burden on non-residential properties. The fees can be used to finance construction of new transportation services or to cover the maintenance costs of the existing system. TUFs have been widely used in several states in the US with varying rates of success (Martinez, 2010).

When one considers the *Income, Payroll-based or Employer tax*, income earners or employers in the region served by the transit system pay an extra increment of income or payroll tax that goes to the public transport agency (Salon, 2014). In France, this was previously known as *Versement Transport* now *Versement Mobilité* and every employer (private or public) with more than 11 employees, who is located within the area managed by a transport authority may be asked to pay a percentage of its total payroll as a transport tax to the authority (Ministère de L' Économie, 2022).

The latter two tools may be considered as indirect tools of value capture, since it is not the increase in the value of land and/or building which is being captured, but they are rather

related to the number of trips carried out or the number of employers employed in a specific area.

3.2 PVC versus LVC

Recurring instruments usually do not separate between the value of buildings from the value of the land. A comparative analysis of 29 European countries has shown that "few countries distinguish between land and the buildings, whereas most countries tax the property as a whole including land and building" (Halleux et al. 2022). For this reason, it is reasonable to use the comprehensive definition developed in Chapter 1 to discuss all options of PVC including recurring forms.

The situation is more difficult for the discussion of non-recurring forms. Generally, public value capture focuses on "unearned benefits". It is commonly accepted that land value increases fall into this category (cf. Chapter 1). There may also be unearned benefits for constructions, provided that the increase in the value of the property exceeds the construction costs. This is regularly the case in regions with high real estate prices. Several external factors influence the level of prices. Economists stress the price determination as the interaction of supply and demand. The determinants of rising land prices either work as drivers of the demand side or barriers on the supply side. Changes such as population increase and local economic growth are important drivers on the demand side. Moreover, public services (especially technical infrastructure) and public-sector expenditures, promoting the quality of life in the city, are reflected in property values. Furthermore, environmental amenities such as a mild climate or a location close to water bodies or mountains may have an influence. These factors are also well known in real estate valuation. They are generally discussed under the notion "macro location". Therefore, from a legal-philosophical point of view, capturing parts of these benefits may be basically justified.

However, there is a problem of valuation. It is generally accepted that the residual method leads to uncertain results, if a relatively small residual (total return) is derived from much larger input variables. The calculation of earnings and investments relates to transactions in the future and is therefore based on assumptions. For this purpose, lump sums are used as empirical values (e.g., construction costs, land values, rents, and interest level). It is disputed to what extent any interest for loans to finance the development should be included in the calculation. The input variables are therefore subject to a certain degree of uncertainty. However, this (relatively) small uncertainty in the input variables leads to a very large uncertainty in the result due to the unfavourable error propagation of the procedure (Hendricks et al. 2021).

Therefore, there are good reasons for taking into account the return from constructions but also good reasons to focus on land value gains. On the one hand, land value gains are undisputedly unearned gains. On the other hand, considerable larger investments are necessary to achieve a return from constructions and the return is very small in relation to these investments. Therefore, we will focus on LVC in our analysis.

3.3 Non-recurring PVC tools

A *Development Agreement* (DA) is a voluntary, but legally binding, contract between one or more developers and a local government. In a DA, developers provide upfront contributions for public improvements and in exchange, the local government grants them the vested development rights, where local zoning and land use entitlements that apply to developers' projects remain unchanged for the duration of the contract. By locking the entitlements for a longer period than otherwise possible, DAs make it easier for developers to secure the upfront financing and protect their investments from potential cancellation in project mid-stream (FHWA, 2020). The term Development Agreement is widely used in the US. In other countries, these agreements are also referred to as *Developer Contributions*, *Developer Obligations* or *Planning Gains*. Planning Gains, also known as Section 106 Agreements in the United Kingdom, or 'planning obligations', refer to developer obligations to obtain planning approval and require additional contributions provided to the Local Planning Authority.

In terms of transportation infrastructure, DAs can be a useful technique in capturing and monetizing anticipated property value increases from new developments along planned major highway corridors or transit-oriented developments (TODs). These capital project-induced DAs can be at corridor level involving multiple jurisdictions or at an individual intersection or station involving a single jurisdiction. In most cases, however, DAs are driven by major real estate development projects initiated by developers and include provisions for additional infrastructure capacity needed for their projects (FHWA, 2020).

On the other hand, *Community Benefits Agreement* (CBA) is a voluntary but legally binding contract between a developer and community representatives committing the developer to fulfil specific obligations for the benefit of the community (e.g. jobs for local residents) in connection with a development project. In exchange, the community provides their support (or at minimum, their acquiescence) for the proposed projects (FHWA, 2020). This is not a PVC tool in the strict sense, but we have included it in our overview for the sake of completeness, as it is a very interesting tool for attracting residents.

In the US the difference between DAs and CBAs is that the former is signed with local governments, whilst the latter is signed with communities. Whilst there are numerous examples of CBA in the US, most of which are linked to major real estate development projects, CBAs associated with dedicated transportation projects are less common, especially those related to highways (FHWA, 2020). In 2005, Georgia STAND-UP succeeded in attaching community benefits language to a City ordinance authorizing almost $2 billion in public funding over a 20-year period for transit-oriented development. The Atlanta BeltLine project involved the development of a 22-mile light rail transit loop encircling the city. The $2.8 billion project is expected to take 25 years and includes transit-oriented design (FHWA, 2020).

A *Joint Development (JD)* is another form of non-recurring tool, where a partnership is formed between the private sector and the local government or public transport agency to

build a real estate project on land controlled by the public sector. The local government or public transport agency captures value by requiring a private developer partner to build a portion of the station amenity as part of their real estate project, thereby reducing their capital costs (Salon, 2014). In other cases, this is also referred to as a *Joint Development Agreement* (JDA), where a public transportation project that integrally relates to, and often co-locates with, commercial, residential, mixed-use, or other non-transit development (FHWA, 2020).

An US example of a Joint Development Program is the one adopted by the Washington Metropolitan Area Transit Authority (WMATA) in connection with the construction of its metro lines. However, the financial contribution and the physical scale of WMATA JD projects are much smaller than those of the more renowned practices in Asia such as Hong Kong, China and Tokyo (Suzuki et al., 2015).

In the *Sale or Lease of Development/Air rights*, the local government or public transport agency acquires land in and adjacent to the public transport facility at the going price before ground is broken to build the public transport system. After the system is built (or concurrently), the owner can enter into long-term leases with developers for ground, air, or subsurface development rights. The added value from the public transport system is capitalized into the lease price (Salon, 2014). Similarly, governments can sell air development rights extended beyond the limits specified in land use regulations (e.g., FAR) or created by regulatory changes to raise funds to finance public infrastructure and services.

Amongst the best-known air rights sales are the ones in São Paulo, Brazil. The city government uses the *Outorga Onerosa de Direito de Construir* (Additional Building Charge; OODC) and Certificates of Additional Construction Potential (CEPACs), as value capture instruments to finance local infrastructure investment. CEPACs are a market-based instrument to finance public urban investments through air rights transactions within designated urban operations. Through CEPACs, municipalities can raise infrastructure investment funds by selling the bearer additional building rights, such as a higher FAR and possible land use changes, that should induce private investments in the transformations wanted by urban development policy (Suzuki et al., 2015).

Through *Transit-focused development fees*, developers working in the vicinity of a public transport system pay extra fees for the privilege of building new real estate projects (Salon, 2014). In London, these fees are called the *Community Infrastructure Levy (CIL)* and are collected on most new building permits in the Greater London area. The CIL revenue will finance part of the Crossrail project (Salon, 2014).

In San Francisco a transit-focused development fee has been in place since the 1980s. The Transit Impact Development Fee exempted residential development, which means that it had not been a large source of revenue for the San Francisco Municipal Transportation Agency, since most development in the past decades in San Francisco had been residential. In 2015 a Transportation Sustainability Fee was introduced, whereby a charge for residential development was included, and the collected funds are available for all sustainable

transportation modes such as transit, pedestrian and cycling infrastructure (Salon, 2014; San Francisco Planning, 2022).

In *Land Readjustment Schemes*, landowners pool their land together for reconfiguration and contribute a portion of their land for sale to raise funds to partially defray public infrastructure development costs (Suzuki et al., 2015). This can be used as a development-based LVC instrument to finance transit and TOD-related investments.

Land readjustment can efficiently assemble the rights of way for guided transit extension projects and simultaneously promote transit-supportive property development around new stations, mainly in suburban areas, if all landholders agree. Land readjustment originated in Germany. Since then it has been used extensively across East Asia, where it was adopted by Japan, the Republic of Korea and Taiwan (Suzuki et al., 2015).

4. Issues: Valuation and geographic range

4.1 General observations

Most of the tools mentioned above require information to what extent the construction of new roads, bridges, or tunnels capitalizes into land values. For this reason, information concerning the value uplift is valuable for households, realtors, local housing developers, and governments (Osland, 2008). It enables especially local governments to try out new finance mechanisms rather than hanging on to their existing ones (e.g. tax increment financing; Hass-Klau 2004).

The distance from the central business district (cbd) is one of the main factors contributing significantly to explain the intraregional spatial variation in housing prices (Osland, 2008). For example, a market analysis in Shanghai from 2008 shows clearly the impact of distance to the city centre on housing prices. In this study the distance in kilometres and the availability by public transport was included, but it was not based on the travel time (Chen and Hao, 2008). Another paper demonstrates the influence of decreasing travel times due to a new subway line on property values (Hiironen et al., 2015). The modelling of distance by travel time is crucial for this paper, as the quality of the road network and the public transport influence the travel time but not the physical distance. However, the influence of the travel time depends basically on the size of the infrastructure project (local or regional), the quality of the local transport system and the monocentric or polycentric structure of the municipality (as explained below).

Regional infrastructure projects (e.g. motorways or lines for long-distance trains) have a considerably larger impact than local projects. For example, the construction of the new high-speed railway line between the major German cities of Frankfurt and Cologne and the construction of a new railway station in Montabaur have significantly reduced the travel time to the two economic centres. This resulted in a significantly above-average increase in land value for both the municipality of Montabaur and the associated district in the period from 1995 to 2002 (the railway line was opened in 2002). The land value increases were

80% in the municipality, 64% in the district and 32% in the federal state of Rhineland-Palatinate (Reuter 2011). However, the impact on land prices on a local scale is relatively similar. Therefore, in our paper we focus on the effects of large infrastructure projects on a local scale, which are analysed in more detail in Sections 4.2 and 4.3.

The quality of the transport system is important to answer the question, if the land values depend more on the quality of the road network or on the quality of the public transport system. In large cities with very good public transport, its impact is considerably stronger than in rural areas, where there are no or only poor public transport connections and people are therefore generally dependent on the car. For example, an analysis has shown that the distribution of land values in Munich can essentially be explained by travel times by public transport, whereas in the rural district of Lüchow-Dannenberg, the quality of the road network is price-determining. The relevance of public transport in cities is based on practical (no traffic jams, no parking problems) and ecological reasons. In view of the climate crisis and the decreasing importance of the car as a status symbol, it can be assumed that public transport will become even more important in the future.

One of the most obvious weaknesses of the monocentric model is the assumption that firms and hence jobs are entirely located in the cbd. The inclusion of sub centres outside of the central part of the study area contributes significantly to explain spatial variation in land values (Osland, 2008). However, the development of infrastructure is based on the analysis of traffic flows and accordingly, a high level of interest in its development is to be expected and thus also reactions on the real estate market. But these can be lower in a polycentric model than in a monocentric model. A gravity-based accessibility analysis can be an approximation towards accounting for how changes in the transport network may manifest itself and have spill-over effects throughout a region (Osland, 2008).

4.2 Geographic range

The impact of the distance to the city centre on the price formation is too small in the immediate vicinity of the centre. There is a nearly linear connection not before the distance is bigger than about 5 km (Hendricks, 2016).

The geographic range of stations of new subway or train lines depends on different circumstances. On the one hand, the distance of stations of the new line is of importance. The maximum geographic range is half of the distance to the next station (FHWA, 2020). On the other hand, already existing lines of public transport have to be taken into account (Hiironen et al., 2015).

An empirical study based on formal statistical modelling using multivariate techniques, direct observations of market property prices in the neighbourhood of a station and professional judgement of local estate agents, property valuers or developers identified the highest value increases between 200 and 500 metres from the station (Hass-Klau, 2004). Similar results have been found in a literature review by Hiironen et al. The authors

identified the highest impact within a distance of 400 metres and still considerable effects up to 800 metres (Hiironen et al., 2015).

4.3 Valuation

The data in the literature on value development in the vicinity of railway stations show a relatively large variance. The literature review of Hiironen et al. (2015) identified price increases for residential properties from 3.2 to 33% (average 10.0) within a radius of 400 metres and from 2.4 to 6.9% (average 4.9) for a distance between 400 and 800 metres. A study for the European Metropolitan Transport Authorities (EMTA) indicates the following land value increases: 10–65% for vacant building land, 3–20% for housing, 4–25% for offices and 6–18% for retailing (highest values between 200 and 500 metres; Hass-Klau, 2004). The announcement of the construction of new lines and the announcement of the stations' locations already result in price increases. However, there might be also a negative effect, if the property is very close to the station (up to 100 metres depending on the mode). Possible explanations are increasing noise and pollution because of the new station (Agostini and Palmucci, 2008) or a feared worsening of the crime statistic (Hiironen et al., 2015). A statistical analysis for Munich detected that a reduction of travel time by public transport of one minute, results in a price increase of residential building land of 4.2 €/m² (Hendricks, 2016).

In total, it is not possible to give general numbers concerning the impact of new infrastructure. An individual analysis is required for each development. Important factors are the size of the infrastructure project, the quality of the local transport system, the monocentric or polycentric structure of the municipality, the distance of stations, the existing transport network, the emissions of the new infrastructure (noise and pollution) and the sub-market of the real estate market (e.g. residential, offices, retail). Determining reliable values requires both the necessary data and the necessary expert knowledge.

5. Discussion / Conclusion

For the effective implementation of value capture, there must first be a clear identification and quantification of the positive effects of the new infrastructure on economic productivity. Additionally, the key beneficiaries of these economic and commercial gains must be identified. Once these inputs are available, the value capture framework provides a range of tools that can be used to harvest a share of the economic uplift. Value capture mechanisms have been identified that could be implemented by local and national governments (Asian Development Bank, 2021). The direct global application of specific public value capture tools may not be possible, due to the contextual circumstances tied to some of these tools, however similar approaches can be applied globally, on a city, regional or national level, as illustrated in Section 3.3.

International best practices have indicated that governments typically employ recurring tax- and fee-based mechanisms. However, non-recurring forms became more and more important over the past 20 years and contract-based value capture techniques – such as

Development Agreements, Community Benefits Agreements, and Joint Development Agreements – are among the most evolved value capture techniques available today. They provide more flexible and less litigious solutions to generating new revenues (FHWA, 2020).

The tools presented share the idea that those who have an advantage from the new infrastructure should be targeted for funding. However, the rational is different in detail. Pure land value capture instruments are Location Benefit Levy/Land Value Tax, Development Agreements, Joint Development Agreements, Sale or Lease Development Rights, Community Infrastructure Levy and Land Readjustment. In contrast, the Transportation Utility Fee and the Employer Tax are essentially based on improved accessibility. Community Benefit Districts and Tax Increment Financing have a mixed rationale as they spread the burden between landowners and business people. All these instruments also have a kind of social profile, as beneficiary landowners, business owners or job holders are called upon to finance the infrastructure. This can keep user fees low for socio-economically weaker groups. Finally, Community Benefit Agreements focus more on increasing the support of the project than its funding.

All instruments presented in this article require data for the calculation of payments. In particular, the difficult questions of how large the geographical range is on the price development in the vicinity of new stations and how the price development is to be quantified have to be answered. Unfortunately, it is not possible to give general numbers for the impact of new infrastructure. An individual analysis is required for each development. In general, there are several well established non-recurring tools for funding the project, if the public sector owns the land or the public sector can offer development rights in exchange for financial contributions of the developers. However, the majority of the revenues go to private property owners. They have the actual possibility to collect the value increase by selling their properties (Hiironen, 2015). For this reason, our future research will focus on the development of a non-recurring tool to capture the land value increase of existing real estates in the development area.

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