Tax Dividend Evaluation of Major Urban Renewal Projects

Rui Nuno Baleiras[a]
Rui Sousa Monteiro[b]
Ana Balcão Reis[c]

[a,b,c] *Universidade Nova de Lisboa*
Faculdade de Economia

December 2004

ABSTRACT

This paper aims at proposing a parsimonious methodology to evaluate the influence of large urban renewal projects on public revenues. The influence is largely endogenous, external to projects and may encompass a broad array of instruments, ranging from local to regional to central governments. We look at licence fees, user charges, piggyback levies, excise taxes, social security contributions, and taxation of property, corporate income, personal income, and value added or sales. The impacts of the project on all these revenues are labelled *tax dividends* for short. There are three novelties in this approach: i) local impacts extend beyond the renewal site to encompass neighbouring districts; ii) a broad set of tax dividends is extracted from real estate appreciation; iii) fiscal elasticities, originally developed by international organisations to estimate cyclically-adjusted budget balances, are offered a new application to capture revenue effects of temporary demand shocks. The evaluation of a project's tax dividends may help governments in their licensing and, above all, in their co-financing decisions. However, the need for rigorous financial evaluations faces too many difficulties in practice, from modelling complexity to information shortages to time constraints to bureaucratic obstruction. The methodology in this paper seeks precisely to deliver feasible, fast and reasonably sound assessments that can be computed before or after the projects' completion.

Keywords: urban renewal; taxation; revenue forecasting; real estate; Expo'98.
JEL's classification: B41; E27; E62; H71; R51; R52.

Acknowledgements
The authors are grateful to Steven Raphael, Renato Rosa and seminar participants at the *Western Regional Science Association* meeting (Maui, HA, USA), E*uropean Regional Science Association congress* (Jyväskylä, Finland), and the Portuguese Society for Research in Economics conference (Lisbon, Portugal). Remaining errors are our own.

Correspondence

Rui Nuno Baleiras
Universidade Nova de Lisboa
Faculdade de Economia
Campus de Campolide
P–1099–032 LISBOA
PORTUGAL
rnbaleiras@fe.unl.pt

Tax Dividend Evaluation of Major Urban Renewal Projects

December 2004

ABSTRACT

This paper aims at proposing a parsimonious methodology to evaluate the influence of large urban renewal projects on public revenues. The influence is largely endogenous, external to projects and may encompass a broad array of instruments, ranging from local to regional to central governments. We look at licence fees, user charges, piggyback levies, excise taxes, social security contributions, and taxation of property, corporate income, personal income, and value added or sales. The impacts of the project on all these revenues are labelled *tax dividends* for short. There are three novelties in this approach: i) local impacts extend beyond the renewal site to encompass neighbouring districts; ii) a broad set of tax dividends is extracted from real estate appreciation; iii) fiscal elasticities, originally developed by international organisations to estimate cyclically-adjusted budget balances, are offered a new application to capture revenue effects of temporary demand shocks. The evaluation of a project's tax dividends may help governments in their licensing and, above all, in their co-financing decisions. However, the need for rigorous financial evaluations faces too many difficulties in practice, from modelling complexity to information shortages to time constraints to bureaucratic obstruction. The methodology in this paper seeks precisely to deliver feasible, fast and reasonably sound assessments that can be computed before or after the projects' completion.

Keywords: urban renewal; taxation; revenue forecasting; real estate; Expo'98.
JEL's classification: B41; E27; E62; H71; R51; R52.

Tax Dividend Evaluation of Major Urban Renewal Projects

1. Introduction

Economic performance within a city is not spatially homogeneous. Quite often, once-prosperous districts lose the lead for new urban fronts and turn into economic blackspots decades later. These depressed areas typically raise a number of economic and social problems, such as poverty, crime and pollution, which may also extend to neighbouring areas. Major renewal projects are development initiatives tailored to improve the urban standards in blackspots. However, these programmes are likely to generate a number of positive externalities. Co-ordination problems may jeopardise their private provision. Even the government may fail to deliver the project if all relevant benefits are not internalised.

As representatives of the public interest, local and upper-tier governments have an obvious interest in major renewal projects and developers turn to them for licensing and financing purposes. At the same time, the public budget constraint is always a key political concern at every government level. A renewal project can be self financed, in which case there is no need for public funding. Yet, the licence decision may well take the public revenue impact into consideration, along with other economic and political effects. More interestingly, there may be renewal proposals with net social benefits, but where private benefits fall below private costs. In this case, the government's willingness to co-finance the project will certainly depend a lot on its public revenue impact. Thus, whatever the case, the assessment of the public revenue potential of a renewal project should appeal to public authorities.

1.1 The analytical approach

Most revenue consequences will depend upon the project's impact on the economy; hence, the economic analysis should precede the financial evaluation. In general, the economic effects differ across space and time. Spatial effects are not restricted to the renewal site. Very often, they spill over to neighbouring city areas, and may also include region and nationwide outcomes. Most in-site effects are internalised by the developer, but generate tax dividends too. The renewal project can also bring important benefits to adjacent city areas, because it either reduces a negative externality—traffic congestion, pollution or crime, for example—or creates a positive externality—such as widely appraised amenities—for agents located therein. In the case of really large renewal projects, there may also be non-local effects to account for. In fact, the project's own expenditure is likely to leak into regional and national suppliers, triggering macroeconomic consequences. Economic effects also differ on time, being permanent or tem-

temporary. The former increase the real value of capital in the economy forever and thus have a lasting impact upon output. Real estate rents, in site and in adjacent areas, capitalise the social net benefits of the renewal project. Temporary effects change the economy during a limited time span. Most of them come out of resource acquisition by the developer, and may include expenditure on planning, compulsory purchases, decontamination, demolition, and construction.

We identify two mechanisms through which the projects affect the economy and thus public revenues: firstly, a permanent asset appreciation, usually restricted to an urban subspace; secondly, a temporary increase in expenditure. We propose to quantify the former mechanism by estimating differential rents; these, in turn, allow us to determine the changes in the general government revenues. The expenditure mechanism triggers macroeconomic impacts and additional tax dividends. We propose to capture them with tax elasticities embedded in a Mundell-Fleming framework. The tax elasticities come from an own adaptation of cyclically-adjusted budget balance estimates by international organisations.

The methodology is easily customisable to particular projects. As an example, we include an application to the large ongoing renewal project in Eastern Lisbon, Portugal, triggered by the 1998 world exhibition—*Expo'98*. Frequently, major renewal projects are prompted by a highly visible event, such as this exhibition or the Olympics. The event itself is likely to cause temporary effects, for example through its impact on the tourism sector—which is likely to improve within the city and its region. Our application also shows how to plug event effects into the analysis. The 2001 present value of tax dividends out of the asset appreciation and expenditure transmission mechanisms were estimated as 1.3 and 2.0 per cent, respectively, of national GDP.

1.2 Links to the literature

To the best of our knowledge, there is no available technique specially designed to suit the envisaged goal: assessment of the public revenue impact of a major urban renewal project. Yet, there are some methodological connections with the analytical tools which have been used in the literature to evaluate the economic effects of a large infrastructure programme. Among others, the list includes export-base approaches (Isserman, 1980; Norcliffe, 1983), input-output tables (Batey *et al*., 2001; Miller, 1998), shift-share analysis (Loveridge and Selting, 1998), macroeconometric frameworks (Bradley, 2000; Röger, 1996),[1] and applied dynamic general equilibrium models

[1] These references are application examples. They focus on the macroeconomic impact of EU's regional policy.

(Pereira and Gaspar, 1999; Pereira, 1997).[2] Richardson (1988) and Blakely (1989, Ch. 5) remain useful introductions to these and other tools. O'Sullivan (2003, Ch. 6) and McCann (2001, Ch. 4) grant fresh surveys on the subject. Such tools can be effective to capture the effects of a large-scale investment programme on the regional or the national economy, by looking at the investment expenditure links with the rest of the economy.

The export-base and input-output models net demand effects only and are popular in regional and interregional analysis. However, they are hardly tailorable for purposes of urban policy analysis. The export-base approach requires an ex ante definition of basic (or export) and non-basic sectors, which is not obvious in large, diversified cities. The computation of input-output tables requires data typically unavailable at the local level. The interest on shift-share techniques springs from their scarce data requirements but is limited by the mechanistic economic explanations these techniques offer.

Demand and supply effects can be provided by macroeconometric and general equilibrium frameworks. Usually, they work out the infrastructure investment as an externality to the production function and may untie short- and long-term economic outcomes. However, the size of the renewal project may be *too micro* to endorse the use of these macroeconomic models. Also, their complexity commands data typically unavailable at the local level and a degree of expertise perhaps incompatible with the time and budget constraints of the commissioning agency.

A major renewal project fuels expenditure into the economy, as explained above. Thus, those tools can help to quantify the demand and supply effects of the project's expenditure. However, a renewal project is much more than an expenditure engine. We believe there are *other* effects to consider as well: they spring from the value society attaches to the project achievements. Suppose the project provides the city with museums, a marina, top-quality zoning restrictions, streetscape improvements, broad road infrastructures, or a new subway line. The social value of these facilities does not need to coincide with their construction cost; in fact, and in principle, the two should be different. We argue that the project's net benefits are transmitted to the economy through the differential willingness to pay for real estate assets in the renewal site and in neighbouring areas. The existing toolbox does not seem to effectively cope with these *other* economic effects. Moreover, even their use to assess the impact of the project's expenditure may prove unfeasible in many actual exercises if their complexity renders the analysis too expensive or too long to accomplish. As far as we know, our methodology innovates in three ways. Firstly, it allows quantifying local impacts out-

[2] Also focusing on EU's regional policy.

side the renewal site. Secondly, it shows how to estimate the value of multiple tax dividends from real estate appreciation. Finally, it extends the usefulness of tax elasticities, currently a hot topic in the public finance literature, to capture temporary effects of demand shocks.

The paper is organised as follows. Section 2 carefully defines the urban development project our methodology applies to. A synopsis of the economic and tax effects of a major urban renewal project is presented in Section 3; they follow from both the asset appreciation and temporary expenditure transmission mechanisms. Sections 4 and 5 elaborate on the specific methodology to quantify the contribution of the former mechanism upon the economy and the tax dividends, respectively. Section 6 details our proposal to measure the economic and revenue effects triggered by the expenditure mechanism. Finally, Section 7 exemplifies an application of the suggested framework—Lisbon's Expo'98 project.

2. A major urban renewal project

As a city grows, it experiences a slow but steady shift in the patterns of land use, mainly due to the gradual suburbanisation of manufacturing activities, pulled out of the urban centre by cheaper land and better interurban road networks in the outskirts or pushed away by environmental protection zoning. At the same time, service activities move into the city centre and residential areas relocate within the urban area. These changes in land use patterns result in higher value added being generated at the urban centre and is likely to boost economic growth in its periphery as well.

2.1 The role of major renewal projects

This gradual process of tertiarisation of the urban area does not evolve homogeneously across space. Sometimes, spots of inertia resist in or close to the city centre, retaining increasingly degraded industrial or residential activity. Such *blackspots* arise because of the strong negative externalities generated either by the industrial activities themselves or by the vicinity of unaesthetic or polluting collective facilities.

An example is provided by the concentration of four or five chemical plants in a 4-km^2 land lot whose activity over several decades has contaminated the soils significantly and continues to spoil the air daily. In this situation, if one firm decides to move away before the others, it will incur decontamination and transfer costs, but it will not capitalise on the potential value of the land, as buyers will continue to suffer the negative externalities imposed by the adjacent firms. Therefore, each firm has the incentive to be the last one to move away, so as to receive the full land value. Another example is a neighbourhood crossed or bordered by a linear transportation infrastructure—railway,

highway or a canal. The revaluation of this zone implies the elimination or the covering up of the whole infrastructure, a project normally surpassing the capacity of local landowners.

So, sometimes the only feasible option to operate the complete regeneration of a depressed urban spot is the renewal of the whole area through a single requalification project. This is the major renewal project our paper addresses.

2.2 Integrated regeneration policies

What then are the main features of the major renewal project we have in mind? First and foremost, the project must be an integrated package of land interventions within the whole blackspot. The project needs to internalise most of the external effects above so as to circumvent the co-operation difficulties of individual landowners. The project is run by one special agent (the *master developer*) empowered to buy all land lots within the *intervention area* (*IA*), possibly through compulsory sale. All land conversion operations, such as ground clearance and soil decontamination, are typically provided by the master developer. The developer is also responsible for the zoning policy in the *IA*, possibly with the co-operation of the local authorities, and guarantees the construction of a number of flagship collective facilities, such as cultural spaces, recreational zones, and access infrastructures to the *IA*. The net proceeds from the resale of land lots, whose value will be capitalised by the project, should help the developer to finance the project, i.e. the land purchases, the conversion costs and the facility construction.

Secondly, and very often, the benefits from the renewal project extend well beyond the *IA*. In fact, real estate in neighbouring districts is depreciated because of its proximity to a depressed area. Hence, whilst the master developer is able to fully internalise the benefits in the *IA*, the same does not occur with the *spillovers generated in the neighbourhood*. These spillover gains can make a case for public co-funding, either by the local government and/or by upper-tier authorities. Calls for public financing can also arise simply because the works needed to renew the *IA* are only effective if their scale extends beyond the geographic boundaries of the *IA*; examples include water-line cleaning, cover-up of highways and railways, and provision of new access ways.

Thirdly, the need to conclude the renewal intervention within a short period also adds pressure for an integrated operation. Note that the land lot resales are the major own revenue of the developer. The credibility of the project as perceived by market players substantially influences the land appreciation at the time those sales occur. There are indeed many cases where the speed of implementation is crucial for the success of the project. Consider, for instance, an urban renewal project associated with the hosting of the Olympics or a Universal Exhibition. This event would certainly add a

substantial visibility to the renewal project, thus enhancing its marketing prospects; at the same time, the event would certainly impose strict deadlines on the project implementation and there would be serious credibility penalties for the developer in case of default. An integrated management of most development interventions speeds up the project implementation.

2.3 Illustration

One example of a major urban renewal project is the *Sydney Olympic Park*. The Park is situated at Homebush Bay, a once depressed industrial area in Sydney. This area had been used as a slaughterhouse, a naval munitions depot, and an uncontrolled waste disposal place. This is a 640-hectare site for which an integrated project was developed.[3] The IA lies between Sydney CBD and Parramatta city. A tentative renewal of the site began as early as the 1980s but the flag event of the 2000 Olympics rendered the project the strong credibility and visibility that galvanized the regeneration and development processes in the area. Several large collective facilities and a good transport and communication infrastructure had to be ready in time for the Games.

The project has always been managed by a master developer, although under different names. In 1991, the *Homebush Development Corporation* was established to oversee the urban renewal of Homebush Bay. Following Sydney's nomination to host the 2000 Olympic Games, the *Olympic Coordination Authority* took responsibility for the planning, urban development and management of the whole area, supervising all construction on Game-related venues, with both public and private funding. Finally, after the Games in July 2001, the *Sydney Olympic Park Authority* was established with responsibility to manage the public assets of the area: open space, venues, parklands and development areas, including the provision and management of infrastructure.

PriceWaterhouse Coopers (2001) documents large business and economic benefits from the 2000 Olympics to Sydney, New South Wales and even Australia. The report identifies benefits related to the very large investment in infrastructure and to a large increase in tourism with the corresponding expenditure expansion.[4]

---

[3] See the *Sydney Olympic Park Master Plan* at http://www.sydneyolympicpark.nsw.gov.au/index.asp?PageType=TemplateA1&CatID=87&DocID=2235.

[4] The International Chair in Olympism, at the Universitat Autònoma de Barcelona, keeps a valuable record of Game-related research, including economic impact studies. See http://blues.uab.es/olympic.studies/web/eng/yellow/dir/et.html.

3. The Economic and Fiscal Effects at a Glance

A major urban renewal project impacts the economy via two channels: appreciation of real assets and expenditure on goods and services. Table 1 helps to sum up both transmission mechanisms. We may recognize the renewal project as a process through which the developer acquires a set of resources to be transformed into a set of results. Some results are tangible, and may include museums, marinas, recreational parks, exhibition centres, sports complexes, mass transport lines and road infrastructures. Intangible achievements may comprise the appreciation of the external image of the city, innovative urban development features pioneered in the country by the major urban renewal project and the self-esteem derived from the achievement capacity of local and national residents. Generally speaking, the set of results impacts the economy via the benefits the society at large derives from its fruition. If society feels wealthier with such achievements, it will possibly produce and consume more goods and services in the future. The problem the applied analyst faces is how to measure such benefits.

Table 1—Economic effects and possible tax dividends

Effect	Length	Recipient government	Public revenue
Asset appreciation			
Stock accumulation and rent increase in the *IA*	Permanent	Local	Prop. tax and others
		Central	T_I and others
	Temporary	Local	Licence fees, real-estate sales tax, and others
Rent increase in adjacent districts	Permanent	Local	Prop. tax and others
		Central	T_I and others
	Temporary	Local	Cap. gains on local govern. property
		Central	Cap. gains on central govern. property
Expenditure			
Master developer	Temporary	Central	T_H , T_C , T_I , and T_{SS}
Private developers	Temporary	Central	T_H , T_C , T_I , and T_{SS}
Tourists	Temporary	Central	T_H , T_C , T_I , and T_{SS}

Legend: T_H —direct taxes on households; T_C —direct taxes on companies; T_I —indirect taxes; T_{SS} — social security contributions.

In our view, the bulk of benefits society enjoys from the *tangible* project achievements are capitalised into urban rents. *In the IA*, this capitalisation proceeds mainly from the creation of new real assets, and secondarily from the appreciation of existing real assets. The former include new buildings and the latter include land and preserved constructions. As explained above, a successful project is also likely to spill over social benefits to *adjacent districts*: these benefits are signalled via higher rents on the existing stock. In both places, there are permanent and temporary effects to take care of. Real estate appreciations are *permanent* effects in the sense that they will remain embodied in market values forever. They accrue tax dividends to both government tiers: the local authority benefits namely from higher *property tax* revenue whilst the central government gains from higher *indirect tax* (T_I) proceeds, among others.

However, the addition of new buildings and facilities provides the local government also with *temporarily* higher revenues: the proceeds from construction licences (occurring during the construction phase only) and an eventual real-estate sales tax. Furthermore, some non-real-estate assets may appreciate as a consequence of the project. For example, take the case of taxi permits in a city whose renewal project brings in a substantial increase in the number of passengers.[5] It is also possible that government property in neighbouring districts becomes more valuable as a consequence of the project. This enables the public owners to reap *capital gain* revenues once, which accounts for another kind of temporary local effect. The next section details this transmission mechanism.

The urban renewal project is expected to generate a different set of economic effects as well, with its own transmission mechanism. The project achievements require expenditure because resources must be used to produce those results. A fundamental expenditure source lies with the master developer: it buys multiple goods and services to transform the *IA*: land lots, multiple labour skills, cement, tar, transport vehicles, etc. The developer needs these goods and services to undertake land purchases, ground clearance and decontamination, land movements, business and household relocations, and the construction of urban infrastructures, including flagship collective facilities, such as museums, multipurpose arenas and marinas. The construction costs in the *IA* of residential, office and commercial buildings, possibly by private developers, also adds to the aggregate expenditure on goods and services. If a flag event is associated with the renewal project, the provision of specific goods and services to be used during the event (ticket offices, computers, marketing initiatives, for instance) also stimulates aggregate expenditure. Often, such events pique the tourism demand in the city and other regions, again expanding aggregate expenditure. It is important to note that these several expenditure inflows are *temporary*: they occur over a limited number of years, roughly encompassing the renewal project length. The temporary output expansion is likely to boost the base of the most important *central government* taxes: *direct taxes on households* (T_H), *direct taxes on companies* (T_C), *indirect taxes* (T_I), and *social security contributions* (T_{SS}).

Note that the two kinds of effects do not overlap. In general, the social benefits from the project achievements do not coincide with the provision costs detailed in the second transmission mechanism. To make the case clear, we can imagine a project that spends the whole budget on excavating and subsequently closing large holes in the *IA* ground. The macroeconomic expenditure effects transmitted by that mechanism would

[5] This is certainly the case of Boston's *Convention & Exhibition Centre* (http://www.mccahome.com/MCCAHome.aspx). Special taxi medallions were sold to capture this benefit.

still exist but, naturally, there would be no lasting results from such a project and so no social benefits to enjoy in the future.

Table 1 makes explicit only two administration tiers: local and central. However, for cases where a regional or state layer exists, the analyst should also take the respective tax dividends into consideration. Typically, regional tax dividends are a linear combination of central and local tax instruments. Finally, details may change from case to case. For instance, in countries where regional and local governments charge indirect levies (e.g. retail sales taxation), asset appreciation may lead to higher permanent subnational indirect tax revenues. See further details in Subsection 5.2.

4. Asset Appreciation Effects on the Economy

The major urban development intervention is likely to renew real estate property substantially in the *IA*. New buildings and collective facilities take the place of industrial plants or deteriorated residential buildings. In principle, the property appreciation in the *IA* is easy to assess given the integrated business model of the master developer. The difference between the final value of capital goods (land, buildings and equipment) in site and its initial value represents an increase in the stock of capital. Hence, the corresponding incremental rental value measures the permanent increase in potential gross domestic product (GDP).

From a macroeconomic perspective, the additional market value of property in the *IA*, dM^{IA}, increases the country's stock of real wealth. We assume below that the marginal propensity to consume out of real wealth equals the adjusted real interest rate, *r*; this is the ordinary real interest rate plus the economic-depreciation rate necessary to preserve the economic value of real estate forever. So, the perspective is consistent with future-oriented consumption theories with bequests: households smooth out their wealth consumption over time by spending every year just the real interest on their wealth, thus being able to bequest the principal to the next generation. Note that assuming a stronger wealth effect without a sound foundation for doing so would run against our conservative approach of avoiding to overestimate revenue impacts.

A comparable macroeconomic effect occurs with the asset appreciation in the adjacent districts. Here, the urban renewal project does not provide new real estate necessarily, but it impacts upon the market value of the existing stock, dM^{A}, where the superscript stands for the locations *adjacent* to the *IA*. The annual increase in private consumption is therefore rdM^{A}.

4.1 Assessment of real estate appreciation

So, in order to quantify the impact of the urban renewal project on private consumption, we need to assess the real estate appreciation in the *IA* and adjacent districts. At this stage, there is a difference to bear in mind between *ex ante* and *ex post* exercises. We say the assessment exercise is ex ante when it is performed *before* the results of the project are observed. Indeed, most programmes include a projection of impacts and public authorities may be very sensitive to tax dividend projections before deciding to license or to co-fund the project. It is also common to find requests for ex post evaluations, i.e. assessment exercises based on *observed* project outcomes.

In the former case, the applied analyst does not observe dM^i, $i = IA, A$. She thus needs to infer the expected market value appreciations. For property in the *IA*, there are normally professional property assessments available, relating to both existing (pre-project) and future property. Given the integrated business model, the master developer is self-interested in acquiring the most efficient price estimates and is aware of the construction potential. We assume that the dM^{IA} value is available to the analyst.[6] A more serious difficulty lies with the projection of dM^A. Since most (if not all) asset appreciations in the adjacent districts are external to the project, there is no hands-on figure to proceed to the next stage. The analyst must therefore focus on the additional rents on the existing stock, ideally breaking down the stock by classes: residential, office, commercial and industrial.

One possible solution uses available databases on market values.[7] In many cities, professional agents collect actual rents or ownership values per sq. ft. and these data are organised by urban districts and property classes.[8] Naturally, the spillover effects of the renewal project tend to decrease as the distance from the *IA* increases. The definition of adjacent districts is a case-by-case decision requiring good wisdom to balance the available zoning of data with the analyst's perception of the spatial decay of spillovers. Once the adjacent area is identified, the analyst should look for a distant district (or collection of districts) with a property mix as close as possible to the one observed in the adjacent area and where project externalities are implausible. Let us de-

---

[6] This value is based on market price assessments, not on construction costs. The shorter and the more credible the marketing phase, the more reliable those assessments are likely to be.

[7] The applied analyst may wish to consider another property assessment method if she has access to a better one. The rest of the paper is not contingent upon the property assessment method.

[8] In general, the true market prices (either rents or ownership values) are unobservable and those databases just record proxies for such prices. For instance, CCIAAR (2001) reports professional value assessments for Rome city and province whereas Confidencial Imobiliário (2000) reports (value) ask quotes for many Portuguese cities recorded by real estate agents.

note such district as the *benchmark* district (*B*). The analyst thus assumes that there will be no project spillovers in the benchmark district.

One interesting feature of asset markets is their capacity for discounting future events with an impact on relevant prices. The more the urban renewal project is credible, the sooner the forward expectations about future prices are embodied in current prices. This seems to be a robust result in the case of projects with credible deadline commitments—which is typical of projects associated with flag events.[9] The following paragraphs describe property assessment in more detail.

a) Ex ante asset price assessments in case of fully credible projects

First, consider an assessment carried out before the project outcomes are known but *after* the credibility of the project is fully perceived by economic agents. By assumption, the available data embody credibility. As soon as the commitment to execute the project within the announced schedule is realised by agents, market prices jump to a higher level and the following evaluation method becomes feasible. Let $\underline{t}$ be the year right before the project is announced and $\overline{t}$ be the latest year for which data are available. The analyst knows the actual price in the adjacent districts at these times, denoted as $p_{\underline{t}}^{A}$ and $p_{\overline{t}}^{A}$, respectively. With no spillovers in the benchmark territory, its observed price growth rate between these two years, $\hat{p}^{B}$, can be used to produce counterfactual data for the adjacent districts. The counterfactual property price level in the adjacent districts at year $\overline{t}$ is simply $q_{\overline{t}}^{A} \equiv p_{\underline{t}}^{A}\left(1+\hat{p}^{B}\right)$; as the two zones have approximately the same property features, we assume that the price level in *A* at time $\overline{t}$ would be $q_{\overline{t}}^{A}$ if there were no renewal project in the *IA*. Panel (a) in Figure 1 illustrates the assessment exercise. By definition, the actual price at time $\overline{t}$ already embodies the credibility of the project. The empirical plausibility of this assumption has to be reflected in price series: once the market fully discounts the future external benefits of the renewal project, the actual prices in *A* and *B* should be evolving in parallel. Now, the difference at year $\overline{t}$ between the actual price and the counterfactual price, $p_{\overline{t}}^{A} - q_{\overline{t}}^{A}$, is a proxy for the price appreciation due to the urban renewal project. Needless to say, the initial condition $p_{\underline{t}}^{B} > p_{\underline{t}}^{A}$ and the terminal condition $p_{\overline{t}}^{B} < p_{\overline{t}}^{A}$ depicted in Panel a) are purely illustrative, although they may represent quite well a situation where the project elimi-

[9] We realise that credible available data (for the analyst as well as for private investors) is crucial albeit difficult to find whenever the financial forecasts of megaprojects are considered. As Flyvbjerg *et al.* (2003) point out, the risk level involved in such projects and their active marketing imply that "megaproject development is currently a field where little can be trusted, not even numbers produced by analysts", so "cost overruns and lower-than-predicted revenues frequently place project viability at risk and redefine projects that were initially promoted as effective vehicles to economic growth as possible obstacles to such growth". This is why we emphasise here the convenience to use data previously audited or scrutinised by a reliable entity. In our application (Section 7), the master developer's data we worked with was previously audited by the Court of Auditors.

nates the initial depressing externalities caused by the blackspot situation at *IA* and also generates positive spillovers from the new amenities provided at *IA*.

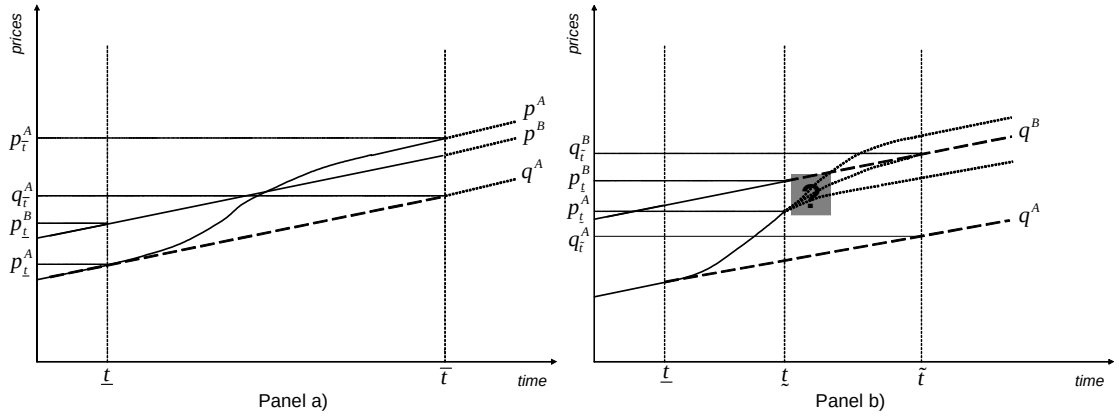

Figure 1—project spillovers and real estate prices at the adjacent and benchmark districts

The reliability of this method depends on at least two things: the expectation formation speed and the choice of the benchmark district. Curves p^A and p^B need to have approximately the same slope as from some moment before $\bar{t}$, otherwise we cannot guarantee that the input data already embody the market assessment of the project spillovers for adjacent areas. The choice of the benchmark district is a delicate issue. It should comprehend a stock composition as close as possible to the one in area *A* and the analyst must be confident enough that average prices in the two areas should evolve according to similar trends and cycles if there were no project spillovers. In practice, the spatial breakdown of available price data tends to reduce the set of feasible alternatives.

b) Ex ante asset price assessments in case of partially credible projects

A second kind of ex ante assessment comes out when the exercise has to be carried out *before* the credibility is acquired. In this case, the observed period is probably too short for market players to anticipate in full the asset appreciation due to the project. The situation is illustrated in Panel b) of Figure 1. Suppose that available data end at time $\tilde{\underline{t}}$, for $\underline{t} < \tilde{\underline{t}} < \bar{t}$. The actual price in *A* at this time, $p^A_{\tilde{\underline{t}}}$, has not fully adjusted to capitalise the spillovers from the renewal project in the *IA*. At this level of generality, we cannot safely project the future evolution of p^B and p^A. We propose to project the former according to the annual growth rate ($\hat{p}^B$) implicit in the existing series. So, $q^B_{\tilde{t}} = p^A_{\tilde{\underline{t}}}\left(1+\hat{p}^B\right)$ is the projected asset price in the benchmark district at the future moment $\tilde{t}$. This moment is the time period when, according to the analyst, the market is expected to fully believe in the project results (expected credibility time). In general, this moment lies sometime after all relevant authorities declare their administrative and financial support to the project and before the major initial negative externalities are

eliminated. Of course, the exact timing is case sensitive and it is up to the applied analyst to balance the particular credibility risks at stake in her application.

As for the unknown pattern of p^A, the square-dotted curves in Panel b) illustrate a few alternative paths, amongst many other possible. Without knowing the details of a specific application, it is quite difficult to predict both the end point and the time path of projected prices in *A*. Perhaps the most we can say on this respect is that, if the initial negative externalities from the intervention area are the sole reason for the price differential between the adjacent and the benchmark districts, then the project accomplishment will at least eliminate the blackspot at *IA* and will let prices in *A* converge to prices in *B* once the market fully acknowledges such elimination, which occurs at time $\tilde{t}$ by definition.

Thus, the reliability of asset appreciation projections is probably weaker in the case credibility is not earned at the time the assessment exercise has to be done. Yet, if the analyst is indeed keen to quantify wealth effects out of the adjacent district, and is content with projected prices $q_{\tilde{t}}^A = q_{\tilde{t}}^B$ as suggested above, it is essential to select a benchmark territory such that the dominant reason for the initial price difference vis-à-vis the adjacent area are the negative spillovers impinged by the degradation of the intervention area upon the surrounding territory.

c) Ex post asset price assessments

To conclude, we refer to the case where the assessment exercise is performed *after* the project completion. This is a fortunate situation for the applied analyst. Here, the available price data, computed by professional specialists, extend well beyond time $\bar{t}$ or $\tilde{t}$ and reflect for sure the capitalisation of the spillover effects. The applied analyst can thus apply the above counterfactual methodology to estimate the appreciation ascribable to the urban renewal project.

4.2 Agglomeration and other permanent effects

Besides the in-site and neighbourhoods effects just analysed, the achievements of the urban renewal project may engender other economic influences, spreading all over the city and contaminating the hinterland region as well. A more harmonious and cohesive urban centre boosts growth opportunities both in the city and in the region. To a large extent, these influences are capitalised into property values and Subsection 4.1 has shown one possible tool to quantify them in the case of the *IA* and adjacent districts. Outside these local areas, the positive effects are smaller and inherently diffuse over space and we therefore recommend ignoring their quantification.

It could be argued that a local urban renewal could improve the general productivity in the economy but we do not give much credit to this possibility. In general, the

activities attracted to the *IA* are not technological upstarts, they are likely to resemble ordinary urban activities, such as offices, housing, retail, culture and leisure. It is true that some collective facilities may have an impact upon the respective industry's productivity—for instance, covered multi-use arenas for large events, theatres, exhibition pavilions or hotels. However, most of that impact is taken up by the facility itself and embodied into its value, thus being already accounted for in Subsection 4.1.

Finally, we should note a number of intangible results of the urban renewal project. Successful large urban renewal projects may create marketable know-how to the master developer and other major actors and can also add self-esteem to the local and even national population. These results are hard to measure, and probably impossible to anticipate in the case of ex ante assessment exercises. Though qualitatively interesting, we do not attempt to quantify them.

5. Tax Dividends from Asset Appreciation

The discussion in the previous section identifies one transmission mechanism of the project's economic impact: the appreciation of real estate in the *IA* and adjacent districts. This appreciation, in turn, affects the revenue of important taxes of all government tiers. We start with the central government tax dividends.

5.1 Central government tax dividends

Section 4 points to at least one major lasting effect of the urban renewal project on the economy: the expansion of private consumption. Private consumption is the largest determinant of indirect taxes revenue, T_I, and so the wealth effect above triggers an increase in this revenue for certain. The next difficulty lies with the quantification of this causality. Typically, tax rates on goods and services are flat, causing the revenue elasticity with respect to the base to equal the unity. The asset appreciation impact on the proceeds of indirect taxation is therefore

$$dT_I = \frac{T_I}{C} r \left(dM^{IA} + dM^{A} \right)$$

per year, where T_I and C are the initial values of indirect taxes revenue and private consumption, respectively. In reality, tax rates differ across goods and services. Actual elasticities estimated from available time series may differ slightly from unity if households change their expenditure composition over the sample period. However, our analysis is a long-term one; as nothing in it supports a change in expenditure mix out of the wealth effect, we consider the above equation to be a reasonable approximation of the true tax dividend.

The aggregate expenditure expansion triggered by the wealth effect is likely to stimulate output and the price level, possibly with different impacts over time. Hence, from a qualitative viewpoint, we cannot exclude the possibility of other central government tax dividends: taxes whose bases are positively correlated to domestic income, such as personal and corporate income taxes and social security contributions, will probably generate more cash to the government in subsequent years as a consequence of the urban renewal project. Yet, as explained in the introductory section, our pragmatic proposal does not comprise a customised macroeconometric model with a sound price-adjusting mechanism. In its absence, we cannot quantify these dynamic effects. Again, we stick to the conservative option of minimising the chances of overestimated tax dividends.

5.2 Subnational tax dividends

A large urban renewal project is also likely to impact upon the revenues of subnational governments. We focus on local proceeds first.

Typical local government revenues include property taxation, excise taxes, piggyback levies, user charges, and licence fees. Consider the (immovable) property taxation to begin with. As explained in Section 4, real estate rents are expected to increase permanently in the *IA* and adjacent districts and this information is essential though insufficient to estimate the project's dividend over this tax. Let $dM_k \equiv dM_k^{IA} + dM_k^{A}$ denote the present value of the future differential-rent stream corresponding to asset class *k* in the city. The number of classes to consider depends on the available information on real estate rents and may encompass broad classes such as housing, commercial, and industrial properties. So, dM_k can be interpreted as the market-value appreciation of assets *k* due to the renewal project. Property tax revenues, T_k, are likely to follow each year. Yet, the link is not straightforward because the actual tax base most countries use differs from market valuation. Typically, tax administrations rely on property assessments for this purpose and the nominal (statutory) tax rate, t_k, is a proportion of the *assessed value* A_k, $t_k \equiv T_k / A_k$. Hence, given t_k, the revenue estimation involves, for each asset class, the estimation of the assessed-value appreciation:

$$dT_k = t_k dA_k \quad .$$

At most, $dA_k = dM_k$ but this is unrealistic as most administrations are unable (or unwilling) to tax the full market value. In order to derive a finer estimation, we can express the actual tax base as a function of the market value, $A_k \equiv a_k M_k$, where a_k—normally smaller than unity—denotes the assessment ratio for asset class *k*. So, the applied analyst must inquire about the assessment ratio in use at the envisaged locations. Knowledge of the rules in practice will generally enable a reasonable assumption with

respect to a_k. With this parameter, the urban renewal project effect on the property tax proceeds from asset class *k* can finally be estimated as

$$dT_k = t_k a_k dM_k \quad .$$

Local governments also have access to excise taxes. The actual bases differ considerably from jurisdiction to jurisdiction, sometimes even within the same country. These bases tend to target economic activities with local relevance, such as hotel turnover in tourist spots, casino revenues in gambling locations, or taxi earnings in large cities. A large urban renewal project may or may not have a sizeable impact upon the revenue of these taxes. It is up to the applied analyst to trade the benefits of accounting for this impact against the costs of performing the evaluation exercise. Given the fact that we are now discussing a narrow tax base, the exercise may be worthwhile when the project impacts *directly* on the base. For example, this is possibly the case of a project that includes a new gambling complex in a jurisdiction with an excise tax on gambling, and has indeed been the case of the new Boston's *Convention & Exhibition Centre*.[10] In many cases, the base estimates are easily available to the analyst because they are part of the project itself.

Piggyback levies are popular in many countries basically because they are an administratively simple method to make broad bases available to local governments. Examples of these bases include personal income, corporate income, retail sales and value added. The administration of these bases is complex and subject to substantial scale economies, which explains why their management tends to be a prerogative of central governments. A piggyback levy allows each local government to share the base apportioned within its jurisdiction. Let B_i be the broad base eligible in jurisdiction *i*; the central government's revenue raised within community *i* is $W_i = wB_i$, where *w* denotes the central government's tax rate.[11] This jurisdiction's piggyback levy is simply

$$T_i = t_i w B_i \quad ,$$

with $0 \le t_i \le 1$ standing for the local tax rate. Therefore, in order to estimate the impact of the urban renewal project on the piggyback levy T_i, we simply have to assess the project's effect upon the base B_i. Since the base is controlled and taxed by the central government, that effect should be scrutinised according to the relevant methodology we

[10] State legislation enabled the imposition of the following excise taxes: 10-dollar levy on each vehicular rental transaction and an additional hotel room tax—actually, an increase of up to 4.5 per cent of the original tax rate.

[11] Indeed, *w* and B_i can be vectors of tax rates and base subtotals, respectively, depending on the actual tax structure.

propose for central tax dividends.[12] The impact on this local tax follows straightforwardly.

Many local authorities are also entitled to licence fees. A licence (or permit) allows the addressee the right to perform a given activity, such as mobile phone operation or taxi business. Some licences are sold while others are granted freely. Urban renewal projects may allow the government to derive money from licensing and, in general, the analyst has simply to look into the project to identify the licence fee potential. The idea is to search for base impacts of *existing* fees and to also find provisions for *new* licence issues. As an example of the former, consider the construction volume induced by the project. Construction typically involves the temporary occupation of public space and many local governments only allow such occupation in return for a licence fee. The relevant dividend estimate is found by applying the predetermined fee structure to the projected construction volume. Boston's *Convention and Exhibition Centre* project provides an example of a new licence fee. The Centre costs were partially financed out of taxi medallion sales specially granted for the project's purpose.

User charges are one more local revenue category the applied analyst should look at. However, contrary to all other categories we have examined in this section, user charges are a form of earmarked finance. Governments collect them in return for a flow of goods or services (water supply, sewerage, solid waste disposal, etc.) they provide to local agents and therefore correspond to a commodity price. Ideally then, we should evaluate the urban renewal project's impact on *net* revenue because, by definition, no user charges are collected without provision costs being incurred.[13] In an actual application, it only makes sense to care about user charges if the project is likely to affect the provision of those goods or services. Typically, the project contains the relevant information to figure out the empirical relevance of such effects. For example, the project may anticipate an increase in the number of households served by the piped-water infrastructure, broken down by income brackets. There are dedicated methodologies to estimate revenues and costs of network expansions and, if time and budget allow, the evaluating team should go through one of these techniques.[14] In any event, some crude indicators can be drawn up by comparing the projected expansion to an ex-

---

[12] See Subsection 5.1 for permanent effects and Subsection 6.1 for temporary effects.

[13] To be fully coherent, the impact on social security revenue should also deduct the impact on future social security payments in countries where earmarking applies. This is more likely the case of fully-funded pension systems and definitely not the case of pay-as-you-go systems. Hence, the applied analyst may wish to evaluate the project's impact on *net* social insurance revenues whenever she has access to studies allowing for an easy and sound projection of the future welfare costs out of a projected current revenue increase.

[14] See the discussion and the references in Fisher (1996) and Bahl and Linn (1992), for example.

isting benchmarking district and this simpler procedure may be enough when the analysts are convinced that the impact on (net) user charges is only a minor dividend.

Finally, grants are an important revenue source for local governments in many countries. They are basically monetary transfers from one government unit to another government unit, whether in the same jurisdictional level (horizontal transfers) or in different jurisdictional levels (vertical transfers). The completion of the renewal project may affect the size of future transfers to the jurisdiction where the project is being undertaken. For example, the betterment programme may attract additional residents to the local community, thus increasing future grants if they are proportional to resident population (as is often the case). Yet, as we wish to evaluate the project's impact upon the revenues of the *general* government, the potential influence of the renewal project on incoming transfers is uninteresting because it is fully cancelled out by a change in the outgoing transfers (expenditures) of another government unit.

One word of caution about potential spillover effects is worth mentioning. Some urban renewal projects may impact on the revenues of more than one local government. This is likely the case when the renewed district is close to jurisdictional borders. These interjurisdictional externalities are often a source of political conflict between adjacent communities when the project's costs are concentrated in one jurisdiction and the benefits spread across multiple jurisdictions. This possibility may render the evaluation of local effects a very sensitive issue. The evaluation exercise should carefully disentangle the project's impact upon the bases of the neighbouring jurisdictions and replicate the techniques above to all parties involved.

Last but not least, we mention the case of regional or state governments. Generally speaking, their revenue portfolio is a combination of the central and local finance tools we have studied above. Hence, there is nothing specific to add. The applied analyst simply has to identify the regional or state revenues and apply the relevant evaluation methodology.

6. Expenditure effects

We now turn to the second transmission mechanism of the project's economic effects. As noted in Table 1, the implementation of a large urban renewal project requires expenditure by the master developer, and possibly by partial (private) developers and event tourists as well. Typically these expenditure flows are concentrated in a restricted time horizon running up to the project conclusion and may change domestic

output.[15] From a qualitative viewpoint, the project expenditure can be realised as an expansionary demand shock.

As is well known, demand shocks normally affect central government's revenues—and some expenditure items. The interest in identifying business cycle effects on the public budget leads macroeconomic authorities to estimate cyclically-adjusted budget balances. The difference between the observed balance and the cyclically-adjusted equivalent is a proxy for the cyclical budgetary effects. National governments and international organisations such as the *IMF*, *OECD*, *European Commission* and *European Central Bank* are currently very active in this area.

As the autonomous expenditure inflow ascribed to the urban renewal project is temporary, we suggest estimating the resulting central tax dividends as cyclical revenue components. For this purpose, we borrow on the growing theory and practice on cyclical tax revenues. Here we will not look at the cyclical position of the economy but instead at the temporary output change ascribed only to the renewal project.

We propose a two-step approach. Firstly, we estimate the temporary macroeconomic effect of the (autonomous) expenditure increase, including the reactions in output, consumption and other relevant variables. Secondly, we turn to tax elasticities (which measure the automatic reaction of public revenues to macroeconomic fluctuations) to determine the effect of those reactions on public revenues. The exposition follows with an explanation of each step, beginning with the latter.

6.1 Estimation of central tax dividends

The computation of the central tax dividends from the project's expenditure makes use of tax elasticities. We build on the approach developed within the *European Central Bank*, and presented in Bouthevillain *et al.* (2001) to obtain cyclically-adjusted budget balances. This approach takes into account that different components of revenue react differently to output changes; instead of looking only at total output and its effect on total public revenue, the approach considers the main revenue categories separately. Broadly speaking, the cyclical component of a revenue category *j* is the revenue change induced by the cycle, dT_j^c, and can be expressed as a proportion of the total observed revenue, T_j, as follows:

$$\frac{dT_j^c}{T_j} = \varepsilon_{T_j b_j} \frac{db_j^c}{b_j} \quad ,$$

[15] For very large economies the appropriate dimension may be the region.

where $\varepsilon_{T_j b_j}$ is the elasticity of revenue category T_j with respect to the base b_j and b_j^c is the cyclical component of the macroeconomic base—for output this would be the output gap.

We adapt this methodology to evaluate the impact of the urban renewal project on public revenue categories. The idea is to define the proportional impact on revenue category *j* as simply the product of the relevant tax elasticity by the project's induced relative change in the macroeconomic base,

$$\frac{dT_j}{T_j} = \varepsilon_{T_j b_j} \frac{db_j}{b_j} \quad . \tag{1}$$

Bouthevillain *et al.* (2001) consider four broad revenue categories: direct taxes on households, direct taxes on companies, indirect taxes and social security contributions. They identify the appropriate macroeconomic bases for each of them and present values for the elasticity of each revenue category relative to the respective base for all EU countries—see their p. 18. The macroeconomic bases are as follows in Table 2.

Table 2—Revenue categories and their bases

Revenue Category	Macroeconomic Base
Direct taxes on households	Employment and compensation of private sector employees
Direct taxes on companies	Gross operating surplus
Indirect taxes	Private consumption
Social security contributions	Compensation of private sector employees

Therefore, the four macroeconomic aggregates whose reaction to the project's expenditure shock we need to estimate are private consumption, gross operating surplus, compensation of private sector employees and employment.

Our approach thus benefits from tax elasticity estimates available for national economies. The project recently led by the *European Central Bank* generated estimates of the relevant tax elasticities for all EU *Member States*.[16] These elasticities were "either econometrically estimated or derived from tax or expenditure rules" (Bouthevillain *et al.*, 2001, p. 7). For other economies it is possible to use the OECD estimates that were also recently revised—see the Appendix of van den Noord (2000).[17]

[16] In our application to the Portuguese case (Section 7 below) we draw on the detailed presentation of all the relevant results by Neves and Sarmento (2001). Detailed studies for other EU countries are also available. Braconier and Forsfält (2004) is an independent study along similar lines for Sweden.

[17] Bouthevillain *et al.* (2001, p. 41) present a comparison between their results and the *OECD*'s for the common set of countries.

6.2 The macroeconomic effects of the urban renewal project expenditure

We now describe the first step of our methodology. The ultimate goal is the estimation of the project's impact upon the tax bases above.

Consider the macroeconomic modelling to begin with. The nationwide macroeconomic effects are temporary: potential output does not react to the increase in planned expenditure. To keep our methodology simple and parsimonious we do not try to model dynamic transitory effects. Instead, we assume that an expenditure increase at year *t* changes output in the same year *t* and only in this year. Following this reasoning, which considers short-run effects only, we assume constant prices. Once again this is justified by the need to keep the methodology simple and parsimonious. Thus, we look at temporary effects on output springing from expenditure expansions while ignoring price reactions.

Capital markets are so integrated today that most urban renewal projects are too small to affect the interest rate. For a small open economy the interest rate is determined abroad. In the case of a large economy, the expenditure increase triggered by carrying out the renewal project is probably not large enough to change the interest rate. Thus, we take the interest rate as given.

Next, we assume a constant exchange rate. This is actually the case of many economies, including many countries pegging their currency to the dollar and also the Euro-zone economies. If we want to apply the methodology to a flexible exchange rate economy, it is necessary to assume that the expenditure shock caused by the renewal project is small enough to affect the equilibrium value of the exchange rate. This will not be an implausible hypothesis in large national economies.

Thus, we propose to use a *Mundell-Fleming approach*. With exogenous exchange and interest rates, the output change caused by a variation in autonomous expenditure is given by the simple *keynesian multiplier*, $\alpha = 1/(1-c+m)$, where c is the estimated marginal propensity to consume out of total income and m the estimated marginal propensity to import. Having determined the total expenditure in goods and services directly imputed each year to the renewal project execution, we multiply these amounts by the keynesian multiplier to obtain the yearly estimated changes in total output.

This is only an intermediate step as total output is not the ultimate macroeconomic aggregate we are interested in. As explained above, our focus lies on the macroeconomic bases listed in Table 2 and their annual changes, db_j. The change in private consumption follows from the previously estimated consumption function. For the other three variables, we recommend the estimation of a relationship between them and

total output, followed by the use of the parameter estimates to project the changes in these aggregates ascribable to the renewal project.

We can now return to equation (1) to compute the central tax dividends of the urban renewal project expenditure. We have only to plug in the annual estimated base changes, db_j, and make use of the relevant elasticities to generate the annual tax dividends.

7. Application

The above methodology was applied to an ex-ante evaluation of the impact of the *1998 World Exhibition* (Expo'98, for short) on public revenues—Baleiras *et al.* 2002. The credibility of the project was already earned when the study was undertaken. It was therefore an application of case a) described in Subsection 4.1. The flag event was held in Lisbon, Portugal, in an originally degraded area bordering the Tagus river. The site, a long strip between the river and a major railway, was the largest industrial area inside the city, including an oil-refinery, a large slaughterhouse, waste dump and treatment facilities, along with military and port warehouses. The refinery was obsolete, the port facilities were unusable and in general the equipment was degraded. The renewal operation, managed by a public-funded firm (*Parque Expo 98*), was linked to the Exhibition, implying the clearing and full treatment of soil prior to the event. Lisbon zoning restrictions were changed in order to reconvert the site for housing, office space and entertainment facilities. A (central) government decree clearly defined the geographical limits of the 340-ha *IA*, granted public interest to it, and assigned *Parque Expo 98* with urban planning authority over the entire *IA*. The neighbourhood of the *IA* could be easily defined by us given the topology of the area and is approximately four times larger than the *IA*. All figures quoted below are expressed at 2001 constant prices, unless otherwise noted. Tax dividends are expressed as 2001 present values, using a 2.5 per cent discount rate.

Regarding **asset appreciation effects**, we considered three areas of local impact: (a) the *IA*, (b) nearby consolidated residential districts, and (c) nearby restructuring districts. In the *IA*, we used financial data from the master developer; disregarding its net profits, we considered (a present) value of 374.8 million euros (€374.8m) of local taxes—including some temporary licence revenue. In the adjacent consolidated residential districts, we searched for a benchmark, another Lisbon district with similar characteristics but not suffering the negative external effects.[18] We then applied the

[18] As we were making an ex-ante analysis with access to data extending beyond the credibility acquisition, we confirmed that the rental rates in those districts actually converged to the benchmark values.

Continues on next page

benchmark price growth rate to those districts, obtaining a €369.77 differential per square metre and a corresponding property appreciation of €737.0m, generating €296.0m local property taxes, plus a wealth effect on central indirect taxes of €165.8m. In the adjacent restructuring districts, we analysed the (probable) changes in the zoning restrictions and computed the expected future built-up areas for residential, office and industrial uses, obtaining a real estate appreciation of €1,213.0m, generating €485.2m in local property taxes, indirect taxes of €272.9m, plus large (but not quantified) capital gains on government property. These additional tax revenues—most of them permanent effects, some temporary (licences)—amounted overall to **€1,594.7m**.

We now focus on **expenditure effects**. We estimated linear functions for consumption and imports using time series for the previous business cycle of the Portuguese economy (1985-1995), obtaining a value of 0.8 for the marginal propensity to consume, *c*, and a value of 0.682 for the marginal propensity to import, *m*, thus implying a keynesian multiplier $\alpha = 1/(1-c+m) \cong 1.134$.[19]

We accessed the master developer's expenditure on the Expo'98 project between 1993 and 2001, as certified by the national *Court of Auditors*. Table 3 presents the expenditure value and the respective effect on output, as determined by the multiplier: $dGDP = \alpha \times d\overline{A}$. The autonomous expenditure increase, $d\overline{A}$, corresponds to the expenditure of the project—the leftmost column. We present values for the proportional change in GDP, as we need them to apply the tax elasticities in equation (1); at the same time, these figures show the dimension of the project at a nationwide level.

Table 3—Master developer's expenditure and GDP impact

Million euros, current prices

	Expenditure	*dGDP*	*dGDP/GDP*
1993	29.62	33.59	0.05%
1994	208.76	236.68	0.32%
1995	195.89	222.10	0.29%
1996	320.98	363.92	0.44%
1997	501.54	568.64	0.64%
1998	802.05	909.34	0.89%
1999	255.72	289.93	0.27%
2000	137.83	156.27	0.14%
2001	113.34	128.50	0.10%

As mentioned in footnote 16, we used the tax elasticities computed by Neves and Sarmento (2001) for the Portuguese economy. To use these elasticities we need to

---

Footnotes, continued from previous page

This convergence was clear by 1998, at a time when the commitment of the Portuguese government and the financial sector to the Expo'98 urban renewal project was already guaranteed.

[19] The choice of a small period for estimation minimizes the risk of structural breaks. Indeed, we obtained statistically significant structural breaks with longer time series.

compute the variations in the following tax bases: private consumption, gross operating surplus, compensation of private sector employees and employment. For private consumption, *C*, we used the previously mentioned estimation of a linear consumption function. For gross operating surplus, *S*, and for the compensation of private sector employees, *W*, we considered that these aggregates changed proportionally with output. Finally, for employment, *N*, we estimated a linear relationship between the logarithm of employment and the logarithm of output allowing us to estimate the elasticity of employment with respect to output as 0.279. After obtaining the changes in the bases, we applied directly the expressions for the tax revenue changes presented in Neves and Sarmento (2001). The expressions are as follows:

$$\hat{T}_H = 1.69\left(\hat{W} - \hat{N}\right) + \hat{N} = 1.69\hat{W} - 0.69\hat{N} \qquad \hat{T}_I = 1.1\hat{C}$$

$$\hat{T}_{Ct} = \min\left\{\hat{S}_t, \hat{S}_{t-1}\right\} + \max\left\{\hat{S}_{t-1} - \hat{S}_{t-2}, 0\right\} \qquad \hat{T}_{SS} = \hat{W} \quad .$$

where $\hat{x}$ stands for the rate of growth of variable *x*, the *T*'s are the central government's tax revenues identified in the legend of Table 1 and the subscript *t* refers to time period whenever this explicit temporal reference is necessary. The change in employment, $\hat{N}$, matters in $\hat{T}_H$ to allow for tax progressivity. As we want to be conservative about the expansion of public revenues induced by the project and we had no access to sound and reliable data on employment, we preferred to assume no progressivity effect on the households' direct taxes; this implied $\hat{T}_H = \hat{W}$.

The table below presents the final values obtained for the four revenue categories in each year. The progressivity effect on households' direct taxes was ignored in these calculations. The 2001 present value of all these revenues is **€1,531.2m.**

Table 4—Central tax dividends from the master developer's expenditure

Million euros, 2001 prices, undiscounted values

	dT_H	dT_C	dT_I	dT_{SS}	Total
1993	2.65	0.00	7.70	5.44	**15.79**
1994	17.76	1.75	55.11	36.63	**111.26**
1995	15.74	13.90	50.15	34.08	**113.87**
1996	25.85	9.99	82.30	55.31	**173.45**
1997	39.13	24.15	125.20	87.44	**275.92**
1998	58.93	36.12	198.63	131.36	**425.04**
1999	18.36	26.34	63.11	40.20	**148.01**
2000	10.11	7.17	32.46	23.77	**73.52**
2001	8.16	4.97	25.84	19.28	**58.24**
Total	**196.67**	**124.40**	**640.50**	**433.52**	**1,395.09**

Applying the same methodology to the forecasted private construction (a temporary increase in autonomous expenditure also ascribable to the project), we obtained a total of **€556.7m**.

The Expo'98 World Exhibition was the flag event associated with the major urban renewal project. We also considered that Expo'98 could increase tourism. Basílio (2002) shows a statistically significant effect, although only temporary, on the net inflow of tourists to the Portuguese economy. This may also be seen as an increase in autonomous expenditure, and so implies an increase in total output. We applied the steps described above again and obtained a total of **€344.3m** for central tax dividends induced by added tourism.

Summing up the effects of the increase in expenditure due to the master developer, private firms and additional tourists, the present value of the central government tax dividends is €**2,432.2m,** at 2001 prices.

Taken together, the public revenue effects springing from asset appreciation and expenditure inflows round up to **€4,026.9m,** or 3.3 per cent of the 2001 Portuguese GDP, and are much higher than the public subsidy given to the project—Exhibition plus urban renewal. As the approach was very conservative and as there were several effects not quantified (for instance, the capital gains on local and central government property), the study confirmed the net social gain derived from the public endorsement of the Expo'98 project.

A final reminder is in order. Tax dividend estimates are not uncertainty-free. Their reliability depends to a great extent on the quality of raw data, such as the project's expenditure and tax elasticities, as well as on the plausibility of additional assumptions the applied analyst may need to consider on her own. We recommend the presentation of pessimistic and optimistic boundaries in cases where confidence in data or assumptions is weaker.

References

BAHL, Roy W. and LINN, Johannes F. (1992), *Urban Public Finance in Developing Countries*, published for The World Bank, New York: Oxford University Press, pp. 241–249, 252–259, 265–271 e 271–280.

BALEIRAS, Rui N., MONTEIRO, Rui S. and REIS, Ana B. (2002), *Avaliação de Impactos do Projecto Global "Expo'98" nas Receitas do Sector Público Administrativo*, Economic Analysis Office, May, Lisbon: Universidade Nova de Lisboa, Faculdade de Economia.

BASÍLIO, Paulo B. (2002), *O Impacto da Expo 98 no Turismo*, Report appended to Baleiras *et al.* (2002), April, Faro (Portugal): Universidade do Algarve, Escola Superior de Gestão, Hotelaria e Turismo.

BATEY, Peter W., BAZZAZAN, Fatemeh and MADDEN, Moss (2001), "Dynamic Extended Input-Output Models: Some Initial Thoughts", in Daniel Felsenstein, Ronald McQuaid, Philip McCann, and Daniel Shefer (eds.), *Public Investment and Regional Economic Development*, Cheltenham (UK): Edward Elgar, pp. 26–38.

BLAKELY, Edward J. (1989), *Planning Local Economic Development: Theory and Practice*, Sage Library of Social Research, Vol. 168, Newbury Park (USA): Sage Publications.

BOUTHEVILLAIN, Carine, COUR-THIMANN, Philippine, VAN DEN DOOL, Gerrit, DE COS, Pablo Hernández, LANGENUS, Geert, MOHR, Mathias, MOMIGLIANO, Sandro, and TUJULA, Mika (2001), *Cyclically Adjusted Budget Balances: an Alternative Approach*, European Central Bank, Working Paper No. 77, September.

BRACONIER, Henrik and FORSFÄLT, Tomas (2004), *A New Method for Constructing a Cyclically Adjusted Budget Balance: the Case of Sweden*, The National Institute of Economic Research, Stockholm, Working Paper No. 90, April. Available at http://www.konj.se/download/18.52c6b4fbbfbe204d7fff3786/wp90.pdf.

BRADLEY, J. (2000), *The Impact of CSF on Objective 1 Countries: 1989–2006*, commissioned study for the European Commission, Regional Policy DG.

CCIAAR (2001), *Listino Ufficiale — Borsa Immobiliare di Roma*, 3rd quarter, Rome: Camera di Commercio Industria Artigianato e Agricoltura di Roma/Azienda per il Mercato Immobiliare.

CONFIDENCIAL IMOBILIÁRIO (2000), *Mercado Imobiliário em Portugal, 1988–1999*, Algés (Portugal): SPNC.

FISHER, Ronald C. (1996), *State and Local Public Finance*, second edition, Chicago: Irwin, pp. 174–190.

FLYVBJERG, Bent, BRUZELIUS, Nils and ROTHENGATTER, Werner (2003), *Megaprojects and Risk: an Anatomy of Ambition*, Cambridge (UK): Cambridge University Press.

ISSERMAN, A. M. (1980), "Estimating Export Activity in a Regional Economy: a Theoretical and Empirical Analysis of Alternative Methods", *International Regional Science Review*, Vol. 5, pp. 155–184.

LOVERIDGE, S. and SELTING, A. (1998), "A Review and Comparison of Shift-Share Identities", *International Regional Science Review*, Vol. 21, No. 1, pp. 37–58.

MCCANN, Philip (2001), *Urban and Regional Economics*, Oxford: Oxford University Press.

MILLER, Ronald E. (1998), "Regional and Interregional Input-Output Analysis", in Walter Isard, Iwan J. Azis, Mathew P. Drennan, Ronald E. Miller, Sidney Saltzman, and Erik Thorbecke (eds.), *Methods of Interregional and Regional Analysis*, Brookfield (USA): Ashgate.

NEVES, Pedro D. and SARMENTO, Luís M. (2001), "The Use of Cyclically Adjusted Balances at Banco de Portugal", Bank of Portugal, *Economic Bulletin*, Vol. 7, No. 3, pp. 99–109.

NORCLIFFE, G. B. (1983), "Using Location Quotients to Estimate the Economic Base and Trade Flows", *Regional Studies*, Vol. 17, No. 3, pp. 161–168.

O'SULLIVAN, Arthur (2003), *Urban Economics*, New York: McGraw-Hill/Irwin.

PEREIRA, Alfredo M. (1997), "Development Policies in the EU: an International Comparison", *Review of Development Economics*, Vol. 1, No. 2, pp. 219–235.

PEREIRA, Alfredo M. and GASPAR, Vítor (1999), "An Intertemporal Analysis of Development Policies in the EU", *Journal of Policy Modeling*, Vol. 21, No. 7, pp. 799–822.

PRICEWATERHOUSE COOPERS (2001), "Business and Economic Benefits of the Sydney 2000 Olympics: a Collation of Evidence", report commissioned by the New South Wales Government, available at http://www.business.nsw.gov.au/facts.asp?cid=309.

RICHARDSON, Harry (1988), "A Review of Techniques for Regional Policy Analysis", in Benjamin Higgins and Donald J. Savoie (eds.), *Regional Economic Development: Essays in Honour of François Perroux*, London: Unwin Hyman, pp. 142–168.

RÖGER, W. (1996) "Macroeconomic Evaluation of the Effects of CSF with Quest II", paper presented at the *European Conference on Evaluation Methods for Structural Funds Intervention*, Berlin, 2–3 December 1996.

van den NOORD, P. (2000), *The Size and the Role of Automatic Stabilizers in the 1990s and Beyond*, OECD, Working Paper No. 230, January.