Promoting Sustainable Land Development Patterns Through Impact Fee Programs

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Abstract

Sustainable urban growth is generally defined as development that meets the need of current residents without compromising the ability of future residents to meet their development needs. Rapid growth can place pressures on local public infrastructure systems, fail to preserve open-space amenities, increase traffic congestion, and degrade local environmental quality. If these problematic outcomes occur, current and future residents bear a burden that is external to the new construction market. Effectively managed economic development is something local and regional governments vigorously pursue, however. We argue that efficient outcomes occur when developers and other decisionmakers face market prices that reflect the full social costs and benefits of their actions. This article outlines the nature of five types of externalities associated with rapid development, describing how each can compromise the long-term sustainability of communities. We advance the idea that properly structured development impact fee programs can internalize dynamic externalities and encourage more sustainable growth patterns. We describe some ways in which local governments already commonly attempt to deal with development externalities, show how impact fee programs have already been used to correct for some of these problems, comment on the ways existing programs could be improved, and outline the most significant obstacles to using impact fee programs in this expanded capacity.

Introduction

The term *sustainable development* means different things to different people. In 1987, the United Nations defined it as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987: 8). The 25 years that have followed have seen unprecedented levels of attention devoted to topics such as urban sprawl, sustainable growth, intergenerational equity, climate change, and environmental justice. Although national and international bodies have played important agenda-setting roles, local governments have led the way in terms of policy implementation, mostly because they have control over building and land use codes. This article considers how rapidly growing cities and their suburbs can use development impact fees to grow in a sustainable manner.

The prominence of cities in the quest for sustainability seems appropriate in light of the role cities have long played in accommodating population growth. When world population surpassed 1 billion in 1800, only 3 percent of humans lived in urbanized areas. This rate increased to 14 percent by 1900 and to more than 30 percent by 1950. World population now sits at about 7 billion, and the United Nations has reported that, for the first time in human history, more than one-half of the world's population lives in urban areas (United Nations, 2010). Estimates from the same study predict this rate will grow to 60 percent by 2030 and 70 percent by 2050. In the United States, four out of five people already live in urban areas, and forecasts predict this ratio will continue to increase. Simply put, developing sustainable cities is the key to long-term sustainability on a larger scale.[1] Our focus on cities is by no means novel. Berke and Conroy (2000: 23) argued, "Sustainable development is a dynamic process in which communities anticipate and accommodate the needs of current and future generations in ways that reproduce and balance local social, economic, and ecological systems."

An ongoing debate in the literature pits local regulatory planning-based approaches against the unregulated free market. Advocates of widespread land use planning and regulation claim that unregulated development leads to urban sprawl, environmental damage, and a diminished quality of life for all residents. The counterargument points out that such policies may sacrifice the power and allocative efficiency of the pricing allocation mechanism (Holcombe, 2004).

We contend that both sides of this issue base their arguments on valid claims and see impact fees as an obvious compromise between the seemingly divergent views. We frame our analysis around the concept of market failure driven by new construction externalities, and we define sustainable development as construction projects that do not impose external costs on third parties in the present or the future. We review five categories of development externalities that the literature has identified. For each, we discuss the nature of the externality and the appropriate policy response. We compare and contrast impact fees with other regulatory interventions that local governments use to respond to these problems. We argue that development impact fees enable local governments to correct for development-driven externalities while retaining the power of the market pricing mechanism. Hence, impact fees represent a compromise in the ongoing debate between comprehensive land use

[1] We focus on regions facing threats to long-run sustainability because they are rapidly expanding. A different set of problems threatens the long-run sustainability of cities such as New Orleans and Detroit, which have lost more than one-fourth of their residents since the 2000 census.

regulation and planning and the laissez-faire approach. We also summarize several weaknesses of impact fee programs as they have typically been implemented and suggest that higher levels of government address global pollutants and other externalities with a large geographic reach.

Market Failure, Externalities, and Sustainability

It is common to characterize suboptimal social outcomes as forms of market failure. We argue that unsustainable development patterns are those that create significant negative externalities. Externalities occur when a decisionmaker carries out an action that imposes a cost on society for which the market pricing mechanism does not account. The resulting market failure associated with negative or positive externalities is that the competitive market equilibrium results in too much or too little of the activity creating the externality. Theories of externalities and market failure flow from both the Pigouvian and the Coasian traditions. Under the Pigouvian approach, the recommended action for avoiding market failure is to levy a tax on the producer of the negative externality equal to the size of the external harm at the socially optimal level of output. The intuition is that, with a properly sized Pigouvian tax in place, private decisionmakers should willingly make decisions that bring about the socially optimal outcome. Coase (1960) noted that inherent coordination interdependencies are generally present among parties, and he advanced the understanding of market failure by framing externality problems as often driven by poorly defined property rights and incomplete markets. This framing supports the well-known argument that conflicts over scarce resources are reciprocal in nature, and that corrective taxation may not produce a socially optimal outcome.

Using the basic market failure model as a starting point, we define development as sustainable if it does not generate significant external costs in the present or the future. This definition can be applied to individual construction projects, but can also be applied more broadly to policy decisions made by governments. Exhibit 1 introduces five categories of development-related externalities

Exhibit 1

Summarizing the Nature and Preferred Policy Solution for the Five Identified Categories of Externalities That Pose Threats to the Long-Run Sustainability of Urban Areas

Externality Threatening Urban Sustainability	Dynamic Reach of the Externality	Geographic Reach of the Externality	Preferred Policy Solution
Nonconforming land uses	Occur immediately and extend over time if competing activities persist	Localized	Usage-based zoning and legal institutions; impact fees for major rezoning and variance cases
Open-space amenities	Primarily dynamic	Localized	Impact fees, local
Congestion externalities	Occur immediately and extend over time	Most relevant at the regional level	Impact fees, local and regional
Compromised local public infrastructure	Occur immediately and extend over time	Localized but may extend to the regional level	Impact fees, local and regional
Degraded local environmental quality	Occur immediately and extend over time	Local, regional, and global	Impact fees, local and regional; global pollutants handled by higher order governments

that pose long-term threats to urban sustainability, which we review in the discussion that follows. Our discussion should not be viewed as exhaustive and we readily acknowledge that individual construction projects may produce more than one type of externality. The interdependency of certain externality pairings complicates our choice to discuss each independently. When the link between categories is particularly strong, we note the connection.

Nonconforming Land Uses

"A bad neighbor is a misfortune, as much as a good one is a great blessing."

— Hesiod, Greek poet, circa 800 BC

Scholars, including Coase (1960), Ellickson (1973), and Fischel (1980), have noted the influence of localized externalities that arise from nonconforming land use patterns in determining the overall efficiency of a given urban environment. The idea is that, when developing a previously unoccupied parcel of land, new construction could harm (or enhance, in the case of positive externalities) the well-being of nearby property owners. For example, negative externalities would plague households living in a quiet residential neighborhood if an automobile repair shop opened directly in their midst. In practice, egregious occurrences of negative externalities driven by nonconforming land use patterns are held in check by informal social mechanisms, formal usage-based zoning regulations, and legal institutions that award damages to parties that can demonstrate direct harm caused by others. For the most part, these simple approaches effectively reduce market failures driven by place-based, localized negative externalities. One convenient aspect of externalities related to nonconforming uses is that they are generally contained within a small geographic area, such that a single jurisdiction governs all involved properties. As such, a desire to enhance welfare and maintain property values in the community provides local governments with incentives that are socially efficient.

Usage-based zoning is not the only way to handle these situations, however, and in extreme cases, it may not even be the most efficient. Houston is often noted as an intriguing counterexample to the efficient zoning argument, because it contains no formal zoning regulations yet displays land use patterns that resemble otherwise similar zoned cities (Siegan, 1970). One goal of usage-based zoning is to prevent projects that will harm the immediately surrounding areas. This approach may be efficient or inefficient, however, depending on the value of the new project. The opportunity cost of prohibiting a given construction project (that is, the difference between the value of that project and that of the next-most valued use for the property) may exceed any external harm to existing nearby properties. For this special case, restrictive zoning that prohibits the project actually reduces social welfare. Suppose a developer wishes to build an apartment complex in a location currently zoned single-family residential, but where she is confident that the current net present value of the multifamily project far exceeds that of alternative uses. Nearby property owners fearing a reduction in the value of their homes would resist a rezoning request, which would therefore likely be denied. The harm to nearby property owners might be dominated in magnitude by the opportunity cost of the apartment complex, however, such that its prohibition is inefficient.

In special cases like this one, in which a rezoning or variance is required to move forward with the project, a monetary payment (for example, an impact fee), direct dedication, or a fee-in-lieu payment could enable the welfare-enhancing development to occur. Assuming an impact fee for

acquiring the modified zoning was set at a correctly determined price, this approach could offer enhanced efficiency properties over rejecting the project. Note that efficiency concerns are met so long as the developer's costs increase by the full amount of the negative externalities generated by the construction. Equity-related concerns could also be satisfied if revenues from this practice were used in ways that directly compensated the parties harmed by the new construction.

In theory, a new category of impact fee could be set equal to the precise impact of the development on nearby property values and could be levied along with other traditional categories of fees. The local government could spend revenues from this fee in ways that mitigated any negative spillovers to bordering properties or to directly compensate the harmed parties. The use of development impact fees for this purpose seems at best impractical, however, and at worst counterproductive. One of the most important aspects of impact fees is that they are predetermined rather than subject to case-by-case negotiation. This reduction in risk and uncertainty has been applauded for creating predictable rules for the development game. Because the nature of these externalities is inherently driven by the unique combination of bordering activities, it is difficult to imagine a local government estimating predetermined impact fees for the set of all conceivable development proposals. Also, if impact fee levies were subject to case-by-case negotiation, they would bring little to no improvement over the longer standing practice of requiring in-kind exactions or cash proffers. We recommend that communities impose no impact fees from this newly proposed category on projects consistent with prezoned land use designations, but that they require projects needing a major rezoning or variance to pay a new impact fee equal to the size of the negative externalities allowed under the rezoning or variance. We admit, however, the application of the rational nexus test to fees of this nature is complicated.[2] The test requires that a reasonable benefit accrue to the payer of the impact fee. In this case, efficient use of the revenues would require spending them in ways that do not benefit the developer, per se. As such, the approval of the variance or rezoning which allowed for the project to move forward would need to be recognized by courts as the benefit felt by the developer.

Open-Space Amenities

"And preserving our open spaces, or having them there for recreational purposes, is one of the things that contributes to the high level of quality of life that we offer in Pennsylvania."

—Ed Rendell, Governor of Pennsylvania, 2002

Another common market failure associated with the development of urban land flows from the failure to adequately preserve open-space amenities. Easy access to nearby open space carries significant benefits for households. The standard urban land use model suggests that the conversion of rural farmland to urban use depends on the land's private productivity in each activity—but not on any benefits accrued by residents who live near the undeveloped land. Ignoring the positive value of open-space amenities, the private market converts land from agricultural to urban use too quickly and to uses that are suboptimal. The question of whether interventions meant to correct for this form of market failure will produce better outcomes is controversial, however. The debate

[2] Because a more detailed description of the rational nexus test and its nuanced applications lies beyond the scope of the present discussion, we direct interested readers to Nelson, Nicholas, and Juergensmeyer (2008).

centers on two related questions that explore the nature of open-space amenities: (1) What open space does and does not produce positive externalities, and (2) does the nature of the positive externality from open space vary across the urban environment?

Irwin (2002) found that the positive effects of open space on property values accrue only when long-term use restrictions are placed on land parcels, and she found that positive capitalization effects are not present when nearby open space is zoned as ready for development. Three factors drive this result. First, long-term dedication ensures that any positive external effects will continue in a dynamic sense, compounding the value of any current benefits. Second, dedication frequently involves modifying the property in specific ways that create the positive externality. For example, most households would prefer to live within a few blocks of a well-maintained public park as opposed to a large agricultural plot. Although both are open space, the farm does not provide the same services to the household that the park does. Third, uncertainty over potential externalities related to nonconforming uses is present when the open space is zoned for easy development but is removed after it is dedicated. Regarding the nature of spillovers across different portions of the urban environment, Anderson and West (2006) showed that proximity to open space is greatly valued by residents who live within core interior urban areas but that these positive effects dissipate significantly as the household moves toward the urban fringe. In a collective sense, these findings suggest that the most important market failure related to open space may not be the pace of development at the fringe, but rather a lack of sufficient interior locations dedicated as useable open space for the long term.

Local governments traditionally have tried to preserve open space in one of two ways. The first approach is directly acquiring public lands in the form of parks, dedicated forests, wildlife preserves, and community land trusts, whereas the second involves adopting exclusionary growth-control policies such as greenbelts, urban growth and service boundaries, density-based zoning, targeted or cluster development programs, permit caps, and even growth moratoria. The first approach addresses the actual nature of the externality problem by removing uncertainty over the current and future use of the open space while ensuring the land will be used in a way that community residents value. On the other hand, the exclusionary growth restriction approach falls short in many ways. First, it does not directly lead to undeveloped land being converted to parks or set aside as dedicated preserves. It does quite the opposite, in fact; these policies have been found to inflate the price of undeveloped land and of residential and commercial structures in within-boundary developable areas while lowering the market price of outside-boundary undeveloped locations (Dawkins and Nelson, 2002). For example, when an adopted greenbelt or urban-service boundary increases the price of undeveloped land within the boundary, it actually increases the opportunity cost of long-term dedication for these sites, making interior open-space preservation less likely. Of course, land outside the boundary may be cheaper, but the literature suggests that dedicated open space in more remote locations generates much lesser positive spillovers on residents.

Although they are certainly not universal, impact fees for parks and recreation are commonly implemented by local governments (Bauman and Ethier, 1987). In Florida, for example, which has used development impact fee programs for more than 35 years, most counties and nearly all the urban counties collect park impact fees (Duncan Associates, 2010). It is unfortunate that, whereas commercial development removes valuable open space, most communities levy parks

and recreation impact fees only on residential developers. Although inefficient, this approach does provide the advantage of simplicity. To successfully levy recreational impact fees on commercial developers or expand programs to include preservation of other valuable open space that is not to be turned into parks open to the public, cities must be equipped with evidence from research that more clearly identifies the significance of these benefits to the parties paying the fees.[3] Doing so would enable the expanded programs to pass the rational nexus test and retain their treatment under the law as fees for services provided rather than as taxes. In considering the approach wherein local governments acquire and maintain permanent recreational open space, we believe that development impact fees enhance and pair with this practice. On the other hand, impact fees do not pair well with growth containment barriers, because the value of undeveloped parcels inside and outside the boundary have already been artificially inflated and reduced, respectively.

We propose a new category of open-space impact fees, equal in size to the magnitude of the spillovers associated with the removal of open space.[4] At least four different approaches to setting these fees are possible, each with advantages and disadvantages.

1. A flat fee per project permitted or developed.
2. A flat fee per acre of land developed.
3. A fee calculated as a proportion of the undeveloped parcels' assessed value.
4. A fee based on the interior square footage of the new construction.

The first and second approaches carry the advantage of simplicity but have significant drawbacks that leave them inefficient and inequitable. The first forces smaller homes and buildings to subsidize larger developments, a troublesome result. Also, when the fee is not affected by the characteristics of the development, a division is placed between the size of the open-space externality and the cost of the fee to the developer. The second approach causes low-density developments to subsidize high-density developments and inefficiently treats centrally and remotely located land the same, although research show they carry different open-space values (Anderson and West, 2006). The third approach overcomes this drawback, because centrally located parcels carry greater assessed values. This approach, however, steps on the heels of local property tax programs and would likely be ruled an unconstitutional ad valorem tax. In comparing the second and third approaches, Anderson (2004) concluded that an impact fee set as a percentage of the parcel's predevelopment value is more efficient than a lump sum fee per acre. Of course, the superiority of the percentage-of-value approach rests on the accuracy of property tax assessments for undeveloped land parcels. Empirical evidence suggests that systematic inaccuracies in assessments do occur, even for improved parcels, which provide sales transactions far more frequently than undeveloped land parcels (Goolsby, 1997; Ihlanfeldt and Jackson, 1982; Kowalski and Colwell, 1986). Very few studies have considered the accuracy of property tax assessments for undeveloped land, and the

[3] Although the practice is still novel, some impact fee analysts have developed methods that allow for this connection, and they have started applying them in Florida. Describing these nuanced methods lies beyond the scope of this article.

[4] We thank an anonymous reviewer for noting that, to levy open-space fees on both residential and commercial properties, park impact fees would need to be apportioned into the fees. This practice already has precedent in many current programs in the United States.

investigations that have generally found it to be less accurate than assessments for other property strata (Burge and Ihlanfeldt, 2005). The fourth approach returns to legally defensible grounds, and it does carry the desirable attribute that larger properties pay more, but the disadvantage is that it severs the direct link between fee size and land conversion. For example, consider the case of a used car dealership. Suppose only a small building is placed in the middle of a paved lot of several acres. The development would pay much less under the fourth approach than it would under the second or third approaches.

In light of these nuanced and often conflicting tradeoffs, we suggest a balanced approach that would implement a per-acre development fee but vary the size of this fee across intuitively distinct geographic zones within the community (or larger metropolitan region).[5] We presume that local governments possess information that speaks to where dedicated open space is the most and least valuable, and they could set rates accordingly. To pass the rational nexus test, revenues should be used to secure undeveloped land and to provide for its long-term preservation as open space.

Congestion Externalities

"A commuter tie-up consists of you—and the people who, for some reason, won't use public transit."
—Robert Breault, opera tenor, 2009

When urban scholars consider the various tradeoffs related to organizing economic activity more or less densely, the phenomena of congestion externalities and crowding of impure local public goods are first-order concerns. Although we choose to limit our discussion to traffic congestion, the sustainability of urban environments can also be threatened by overcrowded public schools, slower response times for police and fire services, and other situations in which congested local public services provide households with reduced utility. One way for growing communities to avoid compromised service levels is to expand the stock of infrastructure, creating a direct connection between congestion externalities and compromised local public infrastructure quality. We recognize this strong interdependency but contend that each topic is worth discussing individually. Traffic congestion is also closely connected to air pollution, a topic we will also discuss.

Arnott and Small (1994) and Downs (2004) are among the contributions that refined an understanding of inefficiencies related to traffic congestion in urban areas. Households make decisions concerning where to live and work, conditional on the transportation costs they face internally but failing to account for the external costs they impose on others by consuming congestible roads. In equilibrium, monetary commuting costs, time commuting costs, energy consumption, pollution, and traffic accidents and fatalities are all greater than they would be if individual decisionmakers paid the full costs of commuting.

Economists traditionally favor tolls as the best way to correct for traffic congestion externalities. It seems intuitive that tolls should be set at their highest levels during peak driving hours and at their lowest levels when traffic is uncongested. Several studies (for example, Decorla-Souza and Kane,

[5] Another way to view our recommendation is that it bears some similarity to a fee program that comprises different tiers so that, for instance, undeveloped land parcels with positive spillover value to different capture areas (neighborhood, community, and region) would have unique impact fees assessed on each level.

1992; Shmanske, 1993; and Small and Yan, 1997) took up the challenge of estimating the optimal size of congestion tolls. An interesting aspect of this literature is that, as tracking and emissions-measurement technologies continue to improve, ideas that were once discussed as only theoretical possibilities are becoming feasible at more reasonable costs. Less efficient interventions that are far easier to implement and administer include offering incentives for driving during offpeak hours, creating carpooling lanes, requiring rush-hour and downtown drivers to purchase licenses, and subsidizing the production and use of mass transit systems.

Transportation impact fees have frequently been used to address the impact of development on urban transportation systems and traffic congestion levels—typically with a focus on ensuring that additional traffic does not flow into areas without concurrent improvements in capacity and coverage. It is perhaps ironic that the advantages and disadvantages of transportation impact fees compared with the alternative approaches to correcting for this market failure both stem from the same distinctive characteristic—the one-time payment of the impact fee relative to the ongoing nature of the other approaches. One clear advantage of a transportation impact fee over an optimal toll program would be ease of implementation and operation. Although advancing technologies are making toll programs more feasible, the costs associated with administering optimal tolls are still high compared with those of impact fee programs. The disadvantage of using transportation impact fees instead of tolls is that individual commuting decisions would not be further impacted daily. Local governments could use transportation impact fees to correct for the average external congestion costs created by a new development, given its characteristics, but not to further influence households' commuting decisions at the margin.

At a given time, the level of traffic congestion in a region is a function of three factors.

1. The spatial distribution of improved structures (for example, homes, apartments, workplaces, and retail stores) in the community.
2. The placement and quality of existing transportation infrastructure (for example, highways, interstates, local roads, and mass transit systems).
3. Individual commuting decisions that are made conditional on the first two factors.

To be effective, transportation impact fees should account for how proposed projects influence the first factor and add to the expected level of congestion in an aggregate sense. An efficient fee would be the amount of money the community needs to improve and expand existing transportation systems, such that the development can be incorporated into the spatial distribution of structures without increasing congestion. Revenues from these fees should be used in ways that improve transportation infrastructure (the second factor) in the most effective ways. Although roads are clearly a top priority, a potentially effective use for these fees in heavily populated urban areas is to improve and expand the reach of existing busing routes and mass-transit systems.[6] Note that the presence of transportation impact fees in no way decreases the effectiveness of policies aimed primarily at influencing the third factor. In tandem, development impact fees and optimal toll programs

[6] For this insightful suggestion and several others that improved this article, we thank Timothy Chapin.

represent an efficient two-part pricing scheme that accounts for the average external cost associated with construction projects and for the marginal costs of daily decisions made by commuters.

A key question is whether adopted transportation impact fees have actually followed the intuition of this approach. The answer is most frequently, and unfortunately, *no*. Transportation impact fees are often uniform across space, and they primarily add capacity to outer portions of the metropolitan area as opposed to expanding the capacity of freeways and arterioles (Blanco et al., 2011). Transportation impact fee programs could be more effective if they were modified to (1) expand major freeways and arteries rather than focusing primarily on roads near the development, (2) levy fees that were higher at the urban fringe and lower at interior locations, (3) fall under the administration of regional transportation planning agencies rather than small local governments, and (4) be less in cases in which individual projects internalized negative effects by formally diverting automobile trips into biking, walking, or mass transit.[7]

Compromised Local Public Infrastructure

"We are still driving on Eisenhower's roads and sending our kids to Roosevelt's schools."

—Blaine Leonard, President of the American Society of Civil Engineers, 2010

As cities across the United States and abroad work to climb their way out of the recent national economic recession, the connection among infrastructure quality, local fiscal health, and urban sustainability has never been clearer. Effectively maintaining adequate systems for roads, schools, water and sewer, police, fire, and recreation without amassing burdensome local public debt is perhaps the best way for cites to enhance their long-term prospects for success and prosperity. The provision of high-quality local public infrastructure can be seen as a way for cities to invest in the stock of physical and human capital they need to compete in the future. Conversely, a failure to maintain the quality of infrastructure systems as population grows rapidly harms both current and future community residents, and it is a dynamic negative externality problem. For simplicity, we focus on the existing quality of infrastructure, holding levels of local bonded debt constant. One could easily take the opposite approach, however, assuming communities hold the quality of infrastructure constant in the face of growth but that bond debt increases. In reality, neither extreme is likely to occur, and growth simultaneously places pressures on both infrastructure quality and outstanding debt.

In the United States, local public infrastructure is financed primarily through property tax revenues, leading to the obvious point that although growth results in new infrastructure needs, it also adds to the property tax base and increases revenues over time. To determine whether a fiscal externality exists, the relevant question is, "Are the additional revenues over time enough to cover the full costs?" Scholars and practitioners have long used fiscal impact analysis as a tool to answer this question, finding that, for most new construction projects in already densely populated areas, the answer is *no*. Altshuler and Gómez-Ibáñez (1993) documented how by far most fiscal impact analyses find most projects do not pay their own way, instead causing existing residents to bear a greater tax

[7] Again, we thank a helpful anonymous reviewer for suggesting the fourth potential modification.

burden as the community covers higher maintenance costs associated with higher levels of usage. Here, the appropriate policy response and the observed policy responses of local governments overlap to an extent, because development impact fees for water and sewer systems, roads, schools, parks, police, and fire have become popular in rapidly growing regions during the past few decades.[8]

When considering the effects of development impact fees, Brueckner (1997) noted the empirical regularity that the per capita costs of building and maintaining most types of local public infrastructure are U-shaped with respect to community population. In rural communities where economies of scale in service provision have not been fully exhausted, development brings positive fiscal externalities in the long run that may partially offset or even dominate any negative externalities in the short run. Burge (2010) noted that a comprehensive approach would consider the overall long-run fiscal impact of the development on the community and account for feedback effects on other revenues and the future demand for infrastructure spending. Because our discussion primarily concerns sustainable growth in already densely populated urban areas, we focus on situations in which any economies of scale in production have already been exhausted, such that the development externality in question is negative. Even after eliminating rural communities from the discussion, however, a distinction still exists between cities and their suburban counterparts. Cities typically have a great deal of existing physical infrastructure, such that their main challenge is effectively maintaining its quality. On the other hand, suburban areas more frequently need to build capacity and likely have newer systems that require less maintenance cost.

From a conceptual perspective, impact fee programs can be used to handle either situation effectively. For growing suburban municipalities, they can be used to expand local public infrastructure systems through a two-part pricing scheme, wherein impact fee revenue covers the upfront costs of adding capacity and recurrent taxes and fees finance the ongoing costs of operation and maintenance. Under this approach, sustainable development occurs when construction projects contribute the full upfront costs associated with their presence in the community, such that the project does not create the pressure to raise other taxes (for example, property taxes) to maintain the quality of local public services. For already infrastructure-rich central cities, however, this conceptual approach makes less sense. For central cities, it makes sense to allow for impact fee revenues to be spent for capital preservation; for example, major maintenance projects such as road resurfacing, school renovations, and equipment upgrades for existing parks and wastewater plants. If impact fee programs are implemented by jurisdictions large enough to cover the central city and its suburbs (for example, counties or regions), programs should be built in flexible ways that allow for revenues to be spent in either manner.

Arguing that impact fee programs *could* help communities effectively maintain the quality of their public infrastructure systems is very different than claiming they *have been used* toward this end. One problematic aspect of how development impact fee programs have been implemented in practice is that they tend to follow an average cost-based approach rather than a marginal cost-based approach (Nelson et al., 2008). Consider two development projects with identical physical

[8] Monetary impact fee programs in the United States date back to the late 1970s. Less formal practices, such as securing in-kind contributions or negotiating ad hoc exactions, have a much longer history.

characteristics that differ only in terms of their proposed locations—one at an interior location near the urban core and the other at a remote location near the urban fringe. The former imposes much less marginal cost on the community, because existing infrastructure systems are already in place to accommodate the new construction. The latter property should face a greater impact fee to account for the external costs it imposes on the system.

It is unfortunate that most impact fee programs levy similar or even identical rates on both types of projects and do not allow for communities to use revenues for large maintenance expenditures, leading to an inefficiently high level of growth in remote areas. For example, in Florida, most counties with impact fee programs levy uniform fees across their entire jurisdiction. Others, including Bay, Clay, Indian River, and Osceola Counties, have geographically defined zones with little variation (in each case, the least expensive zone pays 75 to 90 percent of the most expensive). In fact, only 2 of the more than 40 Florida counties that have adopted programs, Brevard and Broward Counties, have created substantial variation in rates across geographically based zones.[9] Over time, this practice can create a mismatch between where new construction occurs and where existing infrastructure systems can most effectively accommodate growth. On the other hand, one desirable aspect of impact fee programs that the literature often ignores is that impact fees are generally waived when teardown-and-rebuild construction occurs. The practice of providing an impact fee credit based on the property previously occupying the parcel should make gentrification and infill redevelopment projects more attractive than other development locations. An important topic for future research is to investigate the extent to which teardown-and-rebuild construction activity is greater in jurisdictions that impose impact fees but waive them for these projects.

Degraded Local Environmental Quality

"We can no longer afford to consider air and water common property, free to be abused by anyone without regard to the consequences. Instead, we should begin now to treat them as scarce resources."

—President Richard Nixon, State of the Union Address, 1970

Declining environmental quality has become a defining trademark of the past century. Compared with previous generations, we breathe dirtier air, drink dirtier water, deal with more instances of contaminated land, and are more frequently exposed to toxins and carcinogens. Most environmental scholars believe that future generations may fare even worse if dramatic steps are not taken. One similarity between environmental degradation and the previously discussed threats to urban sustainability is that each can be viewed as a market failure driven by externalities. Pollution is a *tragedy of the commons* phenomenon, wherein private decisions fail to account for the social value of clean air, water, soil, and so on (Kahn, 2006). One difference between pollution and the other externalities, however, is that pollution's reach, in both geographic and temporal terms, extends much further. For example, the combustion of fossil fuels to produce energy emits both sulfur dioxide and carbon dioxide. Whereas high concentrations of sulfur dioxide contribute to local pollution problems, carbon dioxide, a significant greenhouse gas, creates a negative externality that

[9] A handful of counties apply impact fees only to projects in the unincorporated portions of the county. In most of these cases, however, municipalities within the county have their own programs with similar or identical rates. Also, school impact fees must be levied uniformly across the entire county, because counties define school districts.

extends globally (Yang, 2006). We acknowledge the potentially extremely far-reaching geographic and temporal reach of pollution externalities while still focusing on how pollution threatens the sustainability of local urban environments. We do so not to downplay the issue of global climate change, but rather to highlight the many ways that local environmental degradation lessens quality of life in the short run, as well. In addition, we focus on optimal policy choices for local governments, and we point out that higher order governments would be the more efficient level at which to address how construction affects the level of global pollutants.[10] As such, we turn to a discussion of how growth can affect the quality of the local environment.

Urban communities across the world struggle to deal with environmental problems, including air pollution and smog, contaminated water sources, localized flooding, brownfields, toxic and nontoxic waste management, and the loss of natural habitats including wetlands. Each of these problems reduces the quality of life for current and future residents. Individual construction projects generally influence these problems through three main channels.

1. The location of the construction relative to the existing developed urban landscape.
2. How the construction affects the immediately surrounding physical environment.
3. The specific physical characteristics of the building.

Regarding the first channel, considerable debate centers on the effect of urban sprawl on environmental quality. The costs associated with sprawling or low-density development have been examined for decades. A well-known study by the Real Estate Research Corporation (1974) presented detailed cost calculations generated by different density configurations. Using newer data and methodological innovations, this approach has since been reexamined and extended (Burchell et al., 2002, 1998; Burchell and Mukherji, 2003). The findings of these studies lend support to the conventional wisdom that sprawl results in significant environmental degradation.

Other studies, however, have taken issue with these findings. Anas and Lindsey (2011) and Gordon and Richardson (2000, 1995) argued that previous studies did not sufficiently account for the fact that, as population has suburbanized, so have employment opportunities. Their results suggest that the concomitant suburbanization of jobs has kept commutes and traffic congestion stable over time. This conclusion was also supported by Holcombe and Williams (2010), who found that sprawl is unrelated not only to commuting time, but also to automobile ownership, per capita miles driven, automobile accident rates, air pollution, and highway expenditures. Kahn (2000) provided some contradictory evidence, finding that the typical suburban household drives 31 percent more miles than the typical central-city household. His findings, however, agreed with those of Holcombe and Williams, who showed that local air quality is not degraded by urban sprawl. A key idea from these prosprawl studies is that some local environmental problems are actually magnified when

[10] Jepson (2011) considered whether locally imposed impact fees could be used as an effective tool to regulate carbon dioxide emissions. We argue that, besides the legal and political challenges he identified, the most serious problem is that because carbon dioxide pollution is not contained spatially, any reduction in local emissions provides a minimal benefit to the residents of the community relative to the overall benefits to society. Also, note that any variation in local impact fee levies on carbon dioxide emissions would violate efficiency, because the magnitude of the externality is not a function of where the carbon dioxide is produced.

economic activity becomes too concentrated. Regardless of which side of the urban sprawl debate is correct, the central issues framing this debate (for example, open space, traffic congestion, higher costs of servicing remote locations, and increased energy consumption leading to global warming) either were discussed previously or have been noted as falling outside the scope of our article. As such, we focus on the second and third channels.

New construction can harm the surrounding local environment in several ways. One is that the effectiveness of water and wastewater drainage systems may become compromised as undeveloped land is converted to improved and paved uses. Besides increasing the risk of localized flooding, the loss of drainable soil causes water to travel over impervious surfaces, picking up pollutants including gasoline, oil, heavy metals, fertilizers, pesticides, and discarded medicines.[11] These pollutants increase the monetary costs of cleaning water for municipal systems and leave more contaminants in untreated discharge that is funneled into nearby streams, rivers, aquifers, and lakes. Unmanaged runoff can also exacerbate the intensity of soil erosion problems. Communities are fortunate that, when lands that directly contribute to the effectiveness of existing drainage and runoff systems are to be converted to improved uses, local regulations often require offset contributions such as retention ponds or infiltration basins. Command-and-control prohibitive regulation is also common, as proposals deemed to have particularly adverse environmental impacts can be prohibited entirely (Hahn and Stavins, 1991).

Another negative externality associated with growth is the destruction or fragmentation of natural wildlife habitats. Although deforestation and desertification have received the most attention, for understandable reasons, the case of lost wetlands provides another interesting example. A *wetland* is a piece of land where the soil is saturated with water, either permanently or seasonally. Wetlands provide a transition between dry land and water bodies, and have been noted as uniquely valuable habitats that serve as an interface between terrestrial and aquatic ecosystems (Barbier, 1993). Although the destruction of wetlands is regulated by federal guidelines, efforts to preserve wetlands commonly involve joint efforts among federal, state, and local governments. One of the most common approaches is to form local wetland mitigation banking programs. In these programs, developers who destroy or degrade wetlands in one location are required to restore, create, or provide enhanced permanent protection for wetlands in other locations.[12] Banking programs have fierce opponents and ardent supporters. Nicholas and Juergensmeyer (2003) proposed that linkage programs such as wetlands mitigation banks be paired with environmental impact fees (commonly called *environmental mitigation fees*) to create efficient incentives for private developers.

We agree with their conclusion and recommend that impact or mitigation fees be set at the cost of preserving the local environmental quality in the long run. Revenues should then be used to secure and preserve the integrity of local habitats and to maintain the quality of local environmental resources (for example, clean water, clean air, and uncontaminated land). Although some communities have implemented environmental mitigation fee programs, such programs are currently sparse

[11] Increased levels of toxins and pollutants in the water supply have been linked to myriad adverse outcomes, including, but not limited to, higher incidences of allergies, chronic illnesses, infertility, and cancer.

[12] See Nicholas and Juergensmeyer (2003) for a more detailed discussion of wetland mitigation banking programs.

and rest on insecure legal footing. Because it can be difficult to establish a clear and proportionate link among individual construction projects, the subsequent environmental damage, and the use of the collected funds to prevent or offset the environmental damage, the primary legal challenge for mitigation fees to date had been passing the rational nexus test.[13]

Turning to the third channel, the physical characteristics of the building relate to the topic of green construction. Green buildings are designed to minimize energy use, save water, and use recycled materials when possible. The most common method of evaluating the environmental friendliness of individual construction projects in the United States is the Leadership in Energy and Environmental Design (LEED) point-based rating system maintained by the U.S. Green Building Council (USGBC).[14] Although many characteristics of green buildings (for example, lower utility and electric bills, and better interior air quality) are valued by the eventual consumers of the facility, potentially reflected in the higher expected selling price, those reducing external harm are not. This discrepancy leads to a situation wherein developers and contractors find it difficult to profitably develop LEED-certified buildings (Kingsley, 2008).[15]

Common local reactions so far have been to offer incentives or subsidies to private decisionmakers, mostly in the form of expedited review or density bonuses.[16] Some programs even include direct payments to private developers who build LEED-certified structures. Rebate programs for homeowners who make energy-saving appliance purchases are also somewhat common (King and King, 2005). One reason direct subsidy payments are rare is that they are costly for already fiscally strained local governments. Moreover, using subsidies to correct for negative externalities is counterintuitive; that practice should be reserved for encouraging positive externalities.

To curb these negative externalities, the correction should come from Pigouvian taxes. Using subsidies, the implicit assumption is that normal construction harms the local environment (that is, construction that creates less harm is rewarded). Using Pigouvian taxes, the assumption is that development should preserve the local environment (that is, projects not meeting that standard pay a penalty). Correctly determined environmental impact fees would not only lead to less pollution,

[13] The three requirements for passing the rational nexus test are (1) establishing a clear connection between new growth and the need for new expenditures, (2) ensuring that fees are proportional to the need for increased spending, and (3) ensuring that the payer of the fee benefits directly from the new spending. These requirements have been problematic for mitigation programs in Florida because wetland banks are rarely close to the developments paying the fees. We argue that the rational nexus test would be easy to satisfy if impact fee revenues were spent in ways that enhance or preserve the local ecosystem, but impact fees may fail the test if they are not.

[14] Gaining LEED certification from the USGBC requires extensive documentation and payment of fees. Certification is based on a 100-point scale and has four distinct levels: certified (40 to 49), silver (50 to 59), gold (60 to 79), and platinum (80 or more). Builders receive points for myriad characteristics, including building near public transportation, limiting stormwater runoff, decreasing expected energy consumption by building above code, using recycled materials, and many other items. This information and more about green building are available at http://www.usgbc.org.

[15] Many private developers are not convinced that building green is profitable. The term *greenwashing* describes attempts by green building advocates to sell the profitability of green buildings.

[16] Another approach would be simply to require that all new construction meet LEED certification standards. Although many state and local governments have requirements that all new public buildings obtain LEED certification, we have not come across local programs that require all private developments to meet this standard. Strict requirements of this kind would discourage some otherwise efficient construction.

they would also generate revenues for local governments.[17] In practice, environmental impact fee rates could be tied to LEED certification levels, with noncertified buildings paying the highest fees and buildings certified at higher levels paying reduced or no fees. A major challenge associated with using impact fees to offset local environmental damage stems from the difficulties associated with accurately measuring the extent of damages and distributing the responsibility across potential sources. Of course, this difficulty plagues any approach to correcting for environmental externalities.

A Market-Oriented Approach to Sustainable Development

We began this article by noting that urban sprawl, sustainable growth, intergenerational equity, and climate change have all received unprecedented levels of attention during the past few decades. In response, city and regional governments have frequently pursued sustainable development as a centerpiece of their planning efforts (Berke and Conroy, 2000; Portney, 2009). During the same period, development impact fees have grown from a stage of infancy to the point at which recent estimates suggest that 1,000 jurisdictions in the United States have programs. We do not view the concurrency of these explosions as coincidental. Somewhat surprisingly, however, the potentially powerful link between the two topics has received very little attention. This article takes a step toward eliminating that divide.

In reviewing the five main types of externalities generated by new construction, we argued that impact fees could play a role in correcting these market failures. Throughout, we have highlighted the many advantages of impact fee programs. Besides serving as a flexible Pigouvian tax that preserves the allocative efficiency of the pricing mechanism, effectively administered programs can reduce uncertainty over the permit approval process, create a direct link between the actions triggering the impact fee and how the revenues will be spent, and align the timing of increased supply and demand for local services. As such, it is not surprising that local governments already frequently use impact fee programs to help provide roads, water and sewer services, schools, parks, police and fire facilities, libraries, and other municipal services. Impact fee programs are by no means a panacea, however. We now summarize the six most serious problems plaguing development impact fee programs as they have commonly been implemented, in each case suggesting how improvements could be made.

1. Whereas communities have demonstrated considerable interest in adopting impact fees that address fiscal externalities, they have shown far less interest in using them to protect the quality of the environment. The two most common types of impact fee programs to date have been for roads and utility services (Burge, 2010). Although revenues from these programs could conceivably be spent to reduce congestion and pollution, no evidence suggests that this spending has occurred. Recent evidence suggests that road impact fees primarily expand the transportation network in periphery areas rather than improving regional freeways and thoroughfares or public transportation (Blanco et al., 2011). In a similar way, water and sewer revenues are primarily used to expand the capacity and reach of the system, rather than to mitigate the system's impact on the local environment. Slightly less prevalent, but often greater in magnitude, are school

[17] Because local governments could then, in turn, lower the rates of other distortionary taxes, this approach relates to the double-dividend hypothesis that Goulder (1995) and Oates (1995), among others, discussed.

impact fees.[18] Although certainly beneficial, these fees again address only an internal fiscal externality. In fact, park and recreation impact fees programs are the only commonly used programs intended to preserve any desirable trait of the local environment. Environmental mitigation fees and charges for non-LEED-certified structures should be used if communities want to address the full range of threats to urban sustainability. This problem relates closely to our second identified problem.

2. Whereas communities have demonstrated considerable interest in adopting impact fees that address externalities contained within their borders, they have shown far less interest in using them to address interjurisdictional spillovers. A single construction project can generate many externalities, each with a different geographic reach. Consider a development that destroys a large tract of wetlands. Ecosystems and natural habitats are large, are interdependent, and do not respect jurisdictional borders. Whereas they take massive amounts of time for nature to build, their value can be compromised relatively quickly. Although local governments may reasonably be expected to address external spillovers contained within their borders, they do not have properly aligned incentives to charge developers for harm done outside of their jurisdiction. This fact marks an important related point—impact fee programs in the United States have most frequently been adopted at the municipal level. Florida and Maryland are the only states that have programs coordinated primarily at the county level (Burge, 2010). Although we believe counties are preferable to municipalities, we would still not expect an increased commitment to county and regional impact fee programs (or better coordination among municipal programs within regions) to have a sizeable effect on the level of global pollutants over time. National and international bodies should levy carbon taxes or create tradable emission programs to pair with locally imposed environmental mitigation fees that address local environmental quality.

3. Most impact fee programs are too rigid. They follow an average-cost pricing approach rather than a marginal-cost pricing approach. They do not reflect the size of the physical structure, the amount of land converted, or the location of the project. A simple example illustrates this problem. To build a 3,000-square-foot home on a 2-acre lot in Dade County, Florida, a developer would currently pay about $10,000 in total impact fees across all categories. In the same community, a developer would pay approximately $9,100 to build a 1,800-square-foot home on a quarter-acre lot. In many communities, no discount for a smaller property would be present at all. Note also that the geographic placement of the two homes would not influence these charges. Setting equity-based concerns aside for the moment, rigidity in levels across different projects may be efficient for categories like school or library impact fees, for which the costs imposed on the existing system, are mostly invariant. Programs for roads, utilities, parks, and any form of environmental protection, however, should respect how the magnitude of the externality relates to the construction's size, land usage, and location. The correct approach would use nuanced impact fee schedules that accounted for the systematic differences in the true social marginal cost of development across these dimensions.

[18] For example, school impact fees in Montgomery County, Maryland, are nearly $22,000 for a 2,000-square-foot single-family home—roughly twice the combined amount of all other impact fees levied on a development.

4. Revenues are spent in ways that do not address the nature of the growth externality, which is not a problem for some common categories of impact fees. Finding an appropriate link between revenues and expenditures for education, park, police, fire, emergency medical service, and public building impact fees is straightforward. On the other hand, the connection for transportation impact fees can be problematic. An efficient transportation impact fee needs at least three components. The first would address traffic flows and accessibility near the development. The second would address the broader effect on the regional network. These components should be used to expand the capacity of the regional highway system. The third would address effects on regional public transit systems. Transportation impact fee revenues are used almost entirely to address the first concern at the detriment of the other two. A similar weakness of most utility impact fee programs is that, although they address the need for expanding the reach of the system, they do not ensure that the system can expand without compromising local environmental quality and the long-run sustainability of water resources. Establishing an appropriate connection between impact fee revenues and expenditures is particularly important for environmental externalities. For example, the Florida wetlands mitigation banking program bears a similarity to impact fees, in the sense that developers who destroy wetlands can pay into a fund that is then used to purchase rural farmland and convert it into wetlands. Critics of this program argue it does not retain the immediate local benefits of the wetlands and that it creates something less valuable than the original natural habitat.

5. Impact fees are not typically collected on all properties creating the externality. The best example of this problem comes from a consideration of open-space amenities. Impact fees for parks represent the only currently used program connected to this problem. Although both residential and commercial developments eliminate valuable open space, only developers of residential property pay park impact fees. Of course, the real problem is that park impact fees have never actually been intended to correct for open-space externalities. Rather, they are simply a means to help finance a specific local public good. As such, another way of thinking about this particular shortcoming is that many impact fee programs take a narrow view of how development affects the community.

6. Impact fee programs are subject to political pressures that have nothing to do with long-run efficient development patterns. In considering the transition from the early impact fee programs of the 1980s to the more recent setting, Burge and Ihlanfeldt (2007) documented how most impact fee programs in Florida started small and expanded incrementally over time. They also showed that current impact fee levies still do not approach most estimates of the full external burden of growth. As such, they argued that impact fees are driven as much by politics and legal uncertainty as by the underlying external costs of development. In addition, empirical results have verified that impact fee adoptions are influenced by the policy implementation decisions of neighboring localities (Jeong, 2006). In perhaps the best example that politics can drive impact fee outcomes, we note that, in response to the recent prolonged recession, many communities have reduced or even rescinded their impact fee levies (Duncan Associates, 2010). These *rollbacks* have been particularly common in California and Florida, where programs are widespread and high profile. Although predictable, this response is not grounded in sound reasoning. No reason

exists to believe that the business cycle controls the magnitude of development-related externalities. In addition, rollbacks compromise equity. Otherwise similar developments are treated differently based only on whether they occurred before, during, or after the rollback.

Conclusions

Development impact fees have rapidly grown in popularity during the past two decades. With few exceptions, implemented programs have been used to cover the costs of providing public infrastructure needed for new development. In so doing, they address the fiscal externalities of growth. The effect of growth, however, goes well beyond budgetary considerations. In particular, development can result in environmental externalities borne by current and future residents. By our definition, these projects represent unsustainable development. Economic theory demonstrates that, under many conditions, the optimal policy response to negative externalities is to impose a tax directly on the offensive activity. In this article, we have argued that development impact fees can be tailored to accomplish this goal in most instances.

The legal distinction between taxes and fees must be kept in mind, however. Impact fee programs most frequently finance capital expansions necessitated by new development and must satisfy the rational nexus test. This test requires that a clear connection exists between new growth and the required spending, that fees are proportional to the costs of providing the enhanced services, and that the payer of the fee benefits directly from the spending. If programs are to be expanded to internalize other types of externalities associated with new development, the rational nexus test may become more difficult to satisfy. Hence, one drawback of the approach we have advocated is the significant attention to design that would need to accompany any program that stood a chance of satisfying the rational nexus test. An alternative approach would be for courts to revisit the rational nexus test in efforts to create a revised version with lower standards, recognizing that the environmental impact of new construction has a larger and potentially less well-defined footprint than its fiscal impact. For example, negative externalities such as smog and traffic congestion operate at the regional level rather than at the jurisdictional level.

A final challenge is that successfully balancing goals related to both equity- and efficiency-based concerns requires more precise measurement of the various negative externalities associated with new construction, which is more easily said than done. Our recommendation for future research, therefore, is careful quantification of the effects, both positive and negative, that specific types of development projects have on both current and future generations.

Acknowledgments

The authors thank Richard Feiock and Christopher Coutts for organizing this symposium on the local benefits of sustainability. They also thank Timothy Chapin and two anonymous reviewers for their helpful suggestions. All errors remain our own.

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