Sustainable Urban Growth and Development Impact Fees

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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 also meet their needs. Without effective management, rapid localized growth can compromise the adequacy of public infrastructure systems, fail to preserve open-space amenities, increase congestion, and degrade local environmental quality. If so, current and future residents bear a burden that is external to current development decisions. At the same time, effectively managed economic development is something local and regional governments vigorously pursue. In considering the arguments for and against economic development, a balanced approach notes that efficient outcomes occur when decision makers face market prices that reflect the full social costs and benefits of their actions. This paper outlines the nature of five significant externalities associated with rapid development, describing how each can threaten the long term sustainability of communities. We advance the idea that properly structured development impact fee programs can internalize dynamic externalities and enhance prospects for more sustainable growth. We document the ways local governments have commonly attempted 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 fees to correct for the remaining threats.

Introduction

The term 'sustainable development' means different things to different people. In 1987 the United Nations defined sustainable development as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs".[1] The 25 years that followed have seen unprecedented levels of attention devoted to topics such as urban sprawl, sustainable growth, intergenerational equity, climate change and environmental justice. And while national and international bodies have played important agenda setting roles, local governments have led the way in terms of policy implementation, largely because these governments have the power to legislate building and land use codes. This paper considers sustainability on a regional scale – placing urban and suburban communities at the heart of the sustainability debate.

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 passed 1 billion in 1800, only 3% of humans lived in urbanized areas. This increased to 14% by 1900 and to over 30% by 1950. World population now sits around 7 billion, and the UN recently reported that, for the first time in human history, over half the world's population lives in urban areas (United Nation, 2010). Estimates from the same study suggest this rate will grow to 60% by 2030 and 70% by 2050. In the US, four out of every five persons 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.[2] Our focus on cities is by no means novel. Berke and Conroy (2000) argue "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."

A key debate in the urban sustainability literature pits the command and control regulatory approach against the unregulated free market. Advocates of widespread land-use interventions claim unregulated development leads to urban sprawl, environmental damage, and a lower quality of life for citizens. However, the counterargument points out this may sacrifice the power and efficiency of the pricing allocation mechanism (Holcombe, 2004). We contend both sides of this debate base their arguments on valid claims, and see an obvious compromise between the seemingly divergent views. We frame our analysis around the concept of market failure driven by construction externalities, defining 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 negative development externalities that have been identified in the literature. For each, we discuss the nature of the externality and the appropriate policy response, with development impact fees frequently playing a role. We compare and contrast impact fees with other regulatory interventions used by local governments to respond to these problems. Our central claim is that development impact fees allow local governments to correct for development externalities without sacrificing the power and efficiency of the market mechanism. Hence, these programs represent the best compromise in the ongoing debate

[1] World Commission on Environment and Development. (1987) *Our Common Future.* Oxford, UK: Oxford University Press, page 8.

[2] We focus on regions facing threats to long run sustainability because they are rapidly expanding. A different, but also important, set of problems threaten the sustainability of cities like New Orleans and Detroit, who have lost over one quarter of their residents since the 2000 census.

between advocates of new urbanism and those who would rely more exclusively on private markets and, as such, should be encouraged over other regulatory interventions.

We also summarize the weaknesses of impact fee programs as they have been implemented, calling attention to the fact that programs focus almost exclusively on fiscal externalities contained entirely within the implementing jurisdiction, as opposed to correcting for interjurisdictional spillovers or environmental externalities. We suggest that, for certain externalities, efforts made by local governments should be better supported by higher levels of government, who could more effectively address negative spillovers affecting larger geographic areas and/or related to long-term global environmental change.

Market Failure, Externalities, and Sustainability

It is common to assert that suboptimal social outcomes are driven by factors related to market failure. We follow this convention and characterize unsustainable development patterns as a form of market failure. Externalities occur when a decision maker carries out an action that imposes a cost on society that is not accounted for by the market pricing mechanism. The standard form of market failure associated with negative (positive) externalities is that the competitive market equilibrium results in too much (little) of the activity creating the externality. Theories of externalities and market failure flow from the Pigouvian and Coasian traditions. Under the Pigouvian approach, the recommended social remedy for avoiding market failure is to levy a tax (subsidy) on the producer of the negative (positive) externality equal to the size of the external harm (benefit) at the socially optimal level of output. The intuition is that, with a properly sized Pigouvian tax in place, private decision makers should willingly make decisions that bring about the socially optimal outcome. Coase (1960) notes the inherent interdependencies that are generally present between parties and further developed the understanding of market failure by accurately framing externality problems as being driven primarily by poorly defined property rights and incomplete markets – characterizing conflicts over scarce resources as being reciprocal in nature.

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 units of analysis as small as individual construction projects, but can also be applied to policy decisions made by governments. Below, we review five types of development related externalities that pose long term threats to urban sustainability. 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 clear interdependency of certain pairings presents a challenge to our approach of discussing each externality independently. When the link between categories is particularly strong, we note the connection.

Non-Conforming 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) among others have noted the influence of localized externalities that arise from non-conforming 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, for 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 non-conforming 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 non-conforming uses is that they generally are contained within a small geographic area and occur immediately, such that a single jurisdiction governs all involved properties. As such, a desire to sustain property values in the community provides local governments with incentives that are socially efficient.

Importantly though, usage-based zoning is not the only way to handle these situations, and in extreme cases, it may not even be the most efficient. Houston is often cited as an intriguing counter-example to the efficient zoning argument since it contains no formal zoning regulations but still thrives (Siegan, 1970), with a pattern of land use that resembles that found in a typical zoned city. One goal of restrictive zoning is to prevent potential incompatible-use based externalities from occurring. However, this may be efficient or inefficient, depending upon the value of the new project. The opportunity cost of prohibiting a given construction project (i.e., any value above the next highest 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 lowers social welfare. Suppose a developer wishes to build an apartment complex in a location currently zoned single-family residential, but where she is also confident the current net present value of the multifamily project is exceedingly large compared to alternative uses. A re-zoning request would be resisted by nearby property owners fearing a reduction in the value of their homes and would likely therefore be denied. However, it is possible that the harm to nearby property owners is dominated in size by the opportunity cost of the apartment complex, such that its prohibition is inefficient.

In cases like this, a monetary payment (e.g., an impact fee), direct dedication, or a fee-in lieu payment would allow the development to occur at a correctly determined price, and would therefore offer enhanced efficiency properties over restrictive usage-based zoning policies. Note that efficiency concerns are met so long as the developer's costs are increased by the full amount of the negative externalities generated by the construction. Satisfying equity related concerns would generally require any fees collected by the government be used in ways that directly compensate the parties harmed by the new construction.

In theory, impact fees could be efficiently used to handle these situations. Local governments would require that developers pay a localized externality impact fee equal to the magnitude of any harmful effects the project has on its immediate neighbors (or provide a subsidy payment for the case of development that generated positive externalities for nearby properties). The government could spend those revenues in ways that mitigated the externality harm or directly compensated the harmed parties. In practice, however, many obstacles prevent development impact fee programs from being used for this purpose. One of the most important aspects of impact fee programs is that they are pre-determined rather than being subject to case-by-case negotiation. This characteristic is thought to reduce the risk/uncertainty over how a developer

will be treated during their quest for final development approval and has been noted as creating predictable rules for the development game. Since the nature of externalities driven by non-conforming land uses is inherently driven by the unique combination of activities present for a particular situation, it is difficult to imagine a local government estimating pre-determined impact fee levies for the set of all conceivable development proposals. And of course, if impact fee levies were initially uncertain and subject to case-by-case negotiation, it is not clear they would be an improvement over existing approaches. However, there is place for impact fees in a more limited application. They could be used to mitigate negative externalities that arise from successful requests for rezonings and variances. That is, impact fees could be kept at uniform levels for development consistent with pre-zoned uses, but could be subject to negotiation for projects that are not. Developments falling within pre-zoned designations are not exposed to uncertainty. And while projects requiring a rezoning/variance are, this uncertainty relates directly to the magnitude of negative externalities generated by their project. This hybrid system of usage-based zoning plus flexible impact fees represents an improvement over an exclusive reliance on zoning.

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, Pennsylvania Governor, 2002

Another common externality driven form of market failure associated with the development of urban land flows from the importance of preserving open-space amenities. Low cost access to nearby open-space carries significant benefits for households and is critical for ensuring long run urban sustainability. The standard urban model suggests the conversion of farmland to urban use depends upon the land's private productivity in agricultural and residential activities – 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 sub-optimal. However, the question of whether or not interventions meant to correct for this market failure will produce better outcomes is controversial. The debate 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) finds the positive effects of open-space on property values accrue only when long-term dedication restrictions are placed on land parcels, and 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 any positive external effects will continue in a dynamic sense – adding to the net present value of any current benefits. Second, dedication can often involve modifying the property in specific ways that add to 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. While both are open-space, the farm does not provide the same valuable services to the household that the park does. Finally, uncertainty over potential externalities related to non-conforming uses is present when the open-space is zoned for easy development but is removed once it is dedicated. Regarding the nature of spillovers across different portions of the urban environment, Anderson and West (2006) show that proximity to open-space is highly valued by residents who live within core/interior urban

areas, but that these positive effects dissipate significantly as the household moves further towards the urban fringe. Collectively, these findings suggest 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.

Traditionally, local governments 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, while the second involves adopting exclusionary growth control policies such as greenbelts, urban growth/service boundaries, density-based zoning, targeted or cluster development programs, permit caps and even growth moratoria. This first approach addresses the true 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 is valued by community residents. On the other hand, the exclusionary growth control approach falls short in many ways. First, it does not directly lead to undeveloped land being converted to parks or dedicated preserves. Quite the opposite in fact, as these policies have been found to inflate the price of undeveloped land and residential/commercial structures in within-boundary developable areas, while lowering the market price of outside-boundary undeveloped locations (Dawkins and Nelson, 2002). So for example, when an adopted greenbelt or urban service boundary increases the price of undeveloped land within the boundary, it actually raises the opportunity cost of long-term dedication for these sites, making interior open-space preservation less likely over the long run. Of course, land outside the boundary may be cheaper – but the literature suggests dedicated open-space in these remote locations produces less intense positive spillovers on residents.

We argue the most sustainable approach to correcting for market failures related to preserving open-space amenities is to levy development impact fees equal to the magnitude of the open-space spillover. And in fact, while 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, where development impact fee programs have been around for nearly thirty-five years, impact fees for parks are collected by a majority of counties, and by nearly all urban counties (Duncan Associates, 2011). In thinking about the initially recommended approach that local governments acquire and maintain permanent recreational open-space, we believe development impact fees *enhance and pair with* this approach while growth containment policies *detract and work against* it. As such, impact fees for parks and recreation are clearly preferred, leaving only a discussion of how to structure the impact fee program remaining.

While commercial development clearly removes open-space, most communities only levy parks/recreation impact fees on residential developers. While this is not consistent with an efficiently designed program, it does provide the advantage of simplicity. Assuming optimal impact fees (i.e., precisely equal to the open-space value of each parcel) are not feasible, we see three simple approaches to levying parks/recreation fees on residential development:

1. A flat fee per residential unit developed.
2. A flat fee per acre of land developed.
3. A fee calculated as a proportion of the undeveloped parcels assessed value.

It should first be noted that, in terms of encouraging dense development, the second approach strictly dominates the first. This is troublesome since, in practice, parks and recreation impact fees are most commonly implemented using the first approach. When the impact fee is fixed in

size – a division is placed between the magnitude of the open-space externality and the marginal cost of the development decision. Relative to the second approach, inefficiently large lots are encouraged. Regarding the second and third approaches, Anderson (2004) concludes that, conditional on several assumptions, an impact fee set as a percentage of the parcels pre-development value is more efficient than a lump sum fee per acre. Of course, the superiority of the percentage-of-value approach implicitly rests upon 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 are more prevalent and turn over more frequently than undeveloped land parcels (Ihlanfeldt and Jackson, 1982; Kowalski and Colwell, 1986; Goolsby, 1997). Very few studies have considered the accuracy of property tax assessments for undeveloped land, and the investigations that do generally find it to be less accurate than assessments for other property strata (Burge and Ihlanfeldt, 2005). We suggest a reasonable course of action would be to implement a per-acre development fee, but to vary the size of this fee across easily defined geographic zones within the larger metropolitan region. Ideally, local governments would be able to identify where dedicated open-space is the most/least valuable, and could set the per-acre rate accordingly. Revenues should be used to purchase dedicated public parks and recreational preserves near the area where they are collected. To an extent, the legal standard of the rational nexus test already ensures this close connection between the location of collections and expenditures would hold.

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/less densely, the phenomenon of congestion externalities and crowding of impure local public goods always plays an important role. While we choose to focus our discussion on traffic congestion, the sustainability of urban environments can also be threatened by overcrowded public schools, slower response times for police/fire services, and other situations where 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 infrastructure quality. We recognize this strong interdependency but contend each topic is worth discussing individually. Traffic congestion is also closely related to air pollution, a topic we also later discuss.

Arnott and Small (1994) and Downs (2004) are among the contributions that have refined an understanding of inefficiencies related to traffic congestion in urban areas. Households make decisions over 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 and using more energy. In equilibrium, monetary commuting costs, time commuting costs, energy consumption, pollution, and traffic accidents/fatalities are all higher than they would be if the full costs of commuting were paid by individual decision makers.

Economists traditionally favor the use of tolls as the best way to correct for traffic congestion externalities. Intuitively, tolls should be set at their highest levels during peak driving hours and at their lowest when traffic is uncongested. Several studies (e.g., Decorla-Souza and Kane, 1992; Shmanske, 1993; Small and Yan, 1997) have taken up the challenge of estimating the size

of optimal congestion tolls. An interesting aspect of this literature is that, as automobile tracking and emissions measurement technologies continue to advance, ideas which were once only discussed as theoretical possibilities are becoming feasible at more reasonable costs. Less efficient interventions that are easier to implement/administer include offering incentives for driving during off-peak hours, car-pooling lanes, requiring rush-hour and downtown drivers to purchase licenses, and subsidizing the production and use of mass transit systems.

Transportation impact fees have also frequently been used to address the impact of development on urban transportation systems and traffic congestion levels –typically with a focus on ensuring additional traffic does not flow into areas without concurrent improvements in capacity and coverage. Perhaps ironically, the advantages and disadvantages of transportation impact fees over 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 certainly making efficient tolling more feasible, the costs associated with implementing and administering optimal tolls would still be very high compared to impact fee programs. The disadvantage of using transportation impact fees instead of tolls would be that individual commuting decisions would not be further impacted on a daily basis. Local governments use transportation impact fees to correct for the average external congestion costs created by a new development given its characteristics, but the fees do not further influence households commuting decisions at the margin.

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

1- The spatial distribution of improved structures (e.g., homes, apartments, workplaces, retail stores) in the metropolitan area.
2- The placement and quality of existing transportation infrastructure including highways, interstates, local roads, and mass transit systems.
3- Individual commuting decisions (which are conditional on the first two factors).

To be effective, transportation impact fees should account for how newly proposed additions to the first factor influence the expected level of congestion in an aggregate sense – i.e., by accounting for the manner in which the first and second channels interact with one another to formulate the environment faced by households making their daily commuting decisions. An efficient fee should be the amount of money the community needs to improve transportation systems, such that the development can be incorporated into the spatial distribution of structures without increasing traffic congestion. Importantly, the use of transportation impact fees in no way lessens the effectiveness of policies primarily aimed at influencing the third factor. In tandem, development impact fees and optimal toll programs represent an efficient two-part pricing scheme that accounts for the average external cost associated with construction projects as well as the marginal costs of decisions made by commuters.

A key question is whether or not adopted transportation impact fees have actually followed the intuition of this approach. Unfortunately, the answer is most frequently no. Transportation impact fees are often uniform across space, and they primarily add capacity to outer portions of the metro 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 freeways/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, and 3) be administered by regional level transportation planning agencies rather than small local governments.

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 U.S. and abroad work to climb their way out of the recent recession, the connection between infrastructure, local fiscal health, and building sustainable communities has never been clearer. Effectively providing and maintaining adequate systems for roads, schools, water/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 then, a failure to expand and maintain infrastructure systems as population grows rapidly can be viewed as taking something valuable away from future community residents, and treated as a dynamic negative externality problem. Hence, another source of market failure with respect to new construction flows from failing to internalize the costs of the additional infrastructure necessitated by the development. For simplicity, we focus attention on how new construction influences the existing quality of infrastructure, holding levels of local bonded debt constant. However, one could easily take the opposite approach, instead assuming communities hold the quality of service provided by infrastructure constant, then focusing on how growth would affect local governmental deficits/debts. In reality, neither extreme is likely to occur, and rapid development can simultaneously place pressures on both.

In the US, local public infrastructure is financed primarily through property tax revenues, leading to the obvious point that even though growth results in new infrastructure needs, it also adds to the property tax base and increases local property tax revenues. 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 analyses as a tool to answer this question, finding that, for most types of new construction, the answer is no. Altshuler and Gómez-Ibáñez (1993) document how a great majority of fiscal impact analyses find that new construction projects do not pay their own way – instead causing existing residents to bear a larger tax burden as the community must extend the reach of public infrastructure systems to accommodate newly developing areas. Here – the appropriate policy response and the observed policy responses of local governments overlap considerably, as development impact fees for water/sewer systems, roads, schools, parks, police, and fire have become popular in rapidly growing regions over the past few decades.[3]

Conceptually, impact fee programs allow local governments to efficiently provide local public infrastructure through a two-part pricing scheme, where any up-front costs of adding capacity and/or extending the system to reach the project are covered with impact fee revenue and the ongoing costs of operating and maintaining infrastructure are financed through recurrent sources (i.e., property taxes for most services but utility users fees for the case of water and

[3] 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.

sewer services). Under this approach, sustainable development occurs when construction projects contribute the full up-front costs associated with their presence in the community, such that the construction does not increase the pressure on property taxes to maintain the level and quality of local public services. Burge (2010) notes that a comprehensive approach must consider the overall long-run fiscal impact the development will have on the community, and should account for future feedbacks effects on revenues and the demand for infrastructure spending. When considering the fiscal effects of development impact fees, Brueckner (1997) accounts for the empirical regularity that the per capita costs of building and maintaining most types of local public infrastructure are U-shaped with respect to population. For this reason, the short and long-run external spillovers can differ not only in magnitude, but also in sign. In small rural communities where economies of scale in production have not been fully exhausted, new construction brings positive externalities in the long-run that may partially offset or even dominate any negative externalities in the short run. Since our discussion is primarily concerned with sustainable growth in densely populated urban areas, we focus on situations where any economies of scale in production have already been exhausted, such that the development externality in question is negative.

Arguing impact fees help communities effectively expand their public infrastructure systems without taking on too much long term debt is very different than claiming they have been used to provide infrastructure *efficiently*. The distinction of course lies in whether or not, as they have actually been implemented in practice, development impact fee levies actually mirror the true marginal costs associated with individual construction projects. A problematic aspect of the way 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 characteristics that differ only in terms of their proposed project location – one being located at an interior location near the urban core while the other is a remote location near the urban fringe. The former imposes a much smaller marginal cost on the community, as existing infrastructure systems are already in place to accommodate the new construction. The latter property should face a higher impact fee to account for the external costs they impose on the system.

Unfortunately, most impact fee programs levy similar or even identical rates on both projects, leading to an inefficiently high level of growth in remote areas. For example, in Florida where impact fee programs are common, most counties with impact fee programs levy uniform fees over their entire jurisdiction. Others including Bay, Clay, Indian River, and Osceola County have geographically defined zones with little variation (in each case the least expensive zone pays 75%-90% of the most expensive). In fact, only two of the more than forty counties that have adopted programs, Brevard and Broward Counties, have created substantial variation in rates across geographically based zones.[4] Over time this can create a mismatch between where new construction occurs and where existing infrastructure systems already have sufficient capacity to accommodate growth. On the other hand, one desirable aspect of impact fee programs which is often ignored is that impact fees are typically waived when teardown/rebuild construction occurs. The practice of providing an impact fee credit based on

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

the property previously occupying the parcel should make gentrification/infill redevelopment projects more attractive relative to other development locations. An important topic for future research is to investigate the extent to which teardown/rebuild construction activity is greater in jurisdictions that impose impact fees.

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."
Richard Nixon, Presidential State of the Union Address, 1970

Declining environmental quality has become a defining trademark of the last century. Compared to 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 future generations may fare even worse if dramatic steps are not taken. A similarity between environmental degradation and the previously discussed threats to urban sustainability is that each can be viewed as market failures driven by externalities. Pollution is a "Tragedy of the Commons" phenomenon, where private decisions fail to account for the social value of clean air/water/soil etc. (Kahn, 2006). However, a difference between pollution and the other externalities is that its reach, both in geographic and temporal terms, extends much farther. For example, the combustion of fossil fuels to produce energy emits both sulfur dioxide and carbon dioxide. While high concentrations of sulfur dioxide contribute to local pollution problems, carbon dioxide, a significant greenhouse gas, creates a negative externality that extends globally (Yang, 2007). We wish to 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 this not to downplay the issue of long term global climate change, but rather to highlight the many ways that local environmental degradation lowers quality of life in the short/medium run as well. Additionally, our focus is on optimal policy choices for *local governments* and we here point out that higher order governments would be the more efficient level to address how construction impacts the level of global pollutants.[5] As such, we turn to a discussion of how new construction can affect the quality of the local environment.

Urban communities across the world struggle to deal with environmental problems including air pollution/smog, contaminated water sources, localized flooding, brownfields, toxic and non-toxic 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.

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

Regarding the first channel, there is considerable debate regarding 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. 1998; Burchell et al. 2002; 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 (1995, 2000) have argued that earlier studies did not sufficiently account for the fact that as population has suburbanized, so have employment opportunities. Their evidence suggests that this concomitant suburbanization has kept commutes and traffic congestion stable over time. This conclusion is also supported by Holcombe and Williams (forthcoming), who find that sprawl is not only unrelated to commuting time, but also unrelated to automobile ownership, per capita miles driven, auto accident rates, air pollution, and highway expenditures. Kahn (2000) provides some contradictory evidence, finding that the typical suburban household drives 31% more miles than the typical central city household. His findings, however, do agree with those of Holcombe and Williams that local air quality is not degraded by urban sprawl. A key idea from these "pro-sprawl" studies is that some local environmental problems are actually magnified when economic activity becomes too concentrated. Regardless of which side of the urban sprawl debate is correct, the central issues framing this debate (e.g., open-space, traffic congestion, higher costs of servicing remote locations, and increased energy consumption leading to global warming) were either discussed above or have been noted as falling outside the scope of our paper. As such, we focus on the second and third channels.

There are several ways new construction can harm the immediately surrounding local environment. One is that the effectiveness of water/wastewater drainage systems may become compromised as undeveloped land is converted to improved/paved uses. Besides increasing the risks 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 drugs/medicines.[6] This increases the monetary costs of cleaning water to be used for municipal systems and leaves 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. Fortunately, when lands that directly contribute to the effectiveness of existing drainage/runoff systems are to be converted to improved uses, local regulations often require offset contributions like retention or infiltration basins. Command and control prohibitive regulation is also common, as proposals that are deemed to have particularly adverse environmental impacts can be disqualified entirely (Hahn and Stavins, 1991).

Another negative externality associated with development is the destruction or fragmentation of natural wildlife habitats. While deforestation and desertification have received the most attention for understandable reasons, another interesting example comes from the case of lost wetlands. A wetland is defined as 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,

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

and have been noted as uniquely valuable habitats that serve as an interface between terrestrial and aquatic ecosystems (Barbier, 1993). While the destruction of wetlands is regulated by federal guidelines, efforts to preserve wetlands commonly involve joint efforts between 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/degrade wetlands in one location are required to restore, create, or provide enhanced permanent protection for wetlands in other locations.[7] Banking programs have fierce opponents as well as ardent supporters. Nicholas and Juergensmeyer (2003) propose that linkage programs like 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/mitigation fees be set at the full 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 (e.g., clean water, clean air, and uncontaminated land). While some communities have implemented environmental mitigation fee programs, they are currently sparse and rest on insecure legal footing. Since it can be difficult to establish a clear and proportionate link between 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.[8]

Turning to the third channel, the specific 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 where possible. The most common method of evaluating the environmental friendliness of individual construction projects in the US follows the Leadership in Energy and Environmental Design (LEED) point based rating system maintained by the United States Green Building Council (USGBC).[9] While many characteristics of green buildings are valued by the eventual consumers of the facility (e.g. lower utility/electric bills, higher interior air quality) and potentially reflected in the higher expected selling price, those reducing external harm are not. This leads to a situation where developers and contractors find it difficult to profitably develop LEED certified buildings (Kingsley, 2008).[10] Common local reactions so far have been to offer incentives/subsidies to private decision makers, mostly in the form of expedited review or density bonuses.[11] Programs sometimes include making direct payments to private developers who build LEED certified structures, but more

[7] See Nicholas and Juergensmeyer (2003) for a more detailed discussion of wetland mitigation banking programs.
[8] State legislatures and state courts have typically applied the "rational nexus" test to impact fee ordinances, which requires (1) a clear connection between new growth and the need for new capital facilities, (2) fees that are proportional to the costs of providing the facility, and (3) the payer of the fee benefit from the new public facilities.
[9] LEED certification from the USGBC requires extensive documentation and payment of fees. It is based on a 100 point scale and has four distinct levels: certified (40-49), silver (50-59), gold (60-79), and platinum (80+). Builders receive points for a myriad of characteristics including building near public transportation, limiting storm water runoff, lowering expected energy consumption by building above code, using recycled materials, and many other items. This and other information on green building can be found at http://www.usgbc.org.
[10] Many private sector developers are also not convinced that building green is profitable just because the government says it is. The term "greenwashing" is sometimes used to describe attempts by green building advocates to sell the profitability of green buildings.
[11] Another approach would be to simply require all new construction meet LEED certification standards. While 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 meet this standard. Strict requirements like this would discourage some otherwise efficient construction from being built.

frequently provide for expedited review or density bonuses. There also exist rebate programs for homeowners who make energy-saving appliance purchases (King and King, 2005). One reason direct subsidy payments are rare is that they are costly for already fiscally strained local governments. Moreover, it is counterintuitive to use subsidies to correct for negative externalities - that practice should be reserved for encouraging positive externalities.

To curb these negative externalities, the correction should come from Pigouvian taxes. Under subsidies, the implicit assumption is that 'normal' construction should harm the local environment (i.e., construction that creates less harm is rewarded). Under Pigouvian taxes, the assumption is that development should preserve the local environment, such that construction not meeting that standard pays a penalty. Again, development impact fees set at levels that reflect the true external damage of the construction should lead to socially efficient outcomes and would be preferred over existing approaches. Not only would correctly determined fees lead to a more efficient outcome, they also generate revenues for local governments.[12] In practice, environmental impact fee rates could be tied to LEED certification levels with noncertified buildings paying the highest fees and higher certification levels paying reduced rates (Kingsley, 2008). A challenge associated with using development 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 other policy related attempts to correct for the externality as well.

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 over 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). In fact, a recent review lists 36 distinct types of policies that have been implemented by US cities in efforts to enhance sustainability (Portney, 2009). Over the same period, development impact fees have grown from a stage of infancy to the point where recent estimates suggest 1,000 jurisdictions in the US have programs. We do not view the concurrency of these explosions as coincidental. Somewhat surprisingly though, the potentially powerful link between the two topics has been given very little attention. For example, impact fees are not among the 36 policies reviewed by Portney (2009). This article takes a step towards eliminating that divide.

In reviewing the main types of externalities generated by new construction, we argued impact fees should generally play a role in correcting these market failures. For the case of non-conforming land uses, we argue developers who operate entirely within existing zoning guidelines should face certainly, but that there may be a limited role for project specific impact fees in cases involving rezonings and variances that clearly lead to negative externalities. To correct for congestion externalities and environmental protection efforts, we proposed local impact fee programs be paired with ongoing optimal tolls and fees from higher order governments, respectively, to attain the best outcome. Throughout, we have highlighted the many advantages of impact fee programs. Besides serving as a flexible Pigouvian tax that

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

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 used, and align the timing of increased supply and demand for local services. As such, it is not surprising that impact fee programs are now commonly used by local governments to help provide roads, water/sewer services, schools, parks, police and fire facilities, libraries and other municipal services. However, impact fee programs are by no means a panacea. We conclude by summarizing the most serious problems with development impact fee programs as they are currently 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. While revenues from these programs could conceivably be spent in ways that make systems more environmentally friendly, there is no evidence to suggest this has occurred. Whereas urban sustainability benefits from reduced commute distances, less traffic congestion, and increased utilization of public transit systems, the evidence suggests road impact fees primarily expand the transportation network in periphery areas rather than improving regional freeways/thoroughfares or public transportation (Blanco et. al, 2010). Similarly, water/sewer revenues are primarily used to expand the capacity and reach of the system, not to mitigate its impact on the local environment. Slightly less prevalent, but often larger in magnitude, are school impact fees.[13] While certainly beneficial, these again address only a fiscal externality. In fact, park/recreation impact fees are the only commonly used program 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 project that destroys a large tract of wetlands. While this affects residents inside the home jurisdiction, this is not where the damage stops. Ecosystems and natural habitats are large, interdependent, and do not respect jurisdictional borders. And whereas they take massive amounts of time for nature to build, their usefulness can become compromised relatively quickly. While it is reasonable to expect local governments to address external spillovers that are contained within their borders, they do not have properly aligned incentives to penalize developers for harm done outside of their jurisdiction. This brings up an important point - impact fee programs in the US have most frequently been adopted at the municipal level. Only in Florida and Maryland are programs primarily operated at the County level (Burge, 2010). As long as they respect the principle we next call attention to, there is reason to believe counties should be preferred over municipalities for implementing programs since they cover larger areas. Still, an increased commitment towards county/regional impact fee

[13] 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 size of all other impact fees levied on the development.

programs (or better coordination between municipal programs within regions) would not be expected to have a sizeable impact 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 to achieve the best outcome.

3. Most impact fee programs are too rigid. They follow as 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 two 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, where the costs imposed on the existing system are largely invariant. However, programs for roads, utilities, parks, and any form of environmental protection 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.

4. Collected revenues are too often spent in ways that do not address the true nature of the development driven externality.

For some common categories of impact fees this is not a problem. Finding an appropriate link between revenues and expenditures for education, park, police, fire, EMS, and public building impact fees is relatively 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 in close proximity to the development. The second would address the same but in terms of the broader impact on the regional network. These should primarily be used to expand the coverage and capacity of the regions highway system. The third would address impacts on regional public transit systems. As we mentioned above, road impact fees should also be paired alongside tolls programs, to address both the initial fixed and ongoing marginal costs imposed on the transportation system. A similar weakness of most utility impact fee programs is that, while they address the need for expanding the reach and capacity of the system, they do not typically ensure the system can expand without compromising local environmental quality and the long run sustainability of the underlying water resources. In fact, establishing an appropriate connection between impact fee revenues and expenditures is particularly important for any environmental externality that is targeted. 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 used to purchase rural farmland to be converted in wetlands. Critics of this program have argued it does not retain the immediate local benefits of the wetlands and that it creates something far 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. While 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 impacts 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) document how most impact fee programs in Florida started small and expanded slowly over time. They also show that current impact fee levies still do not approach most estimates of the full external burden of growth. As such, they argue impact fees are driven as much by politics and legal uncertainty than the true underlying external costs of development. Additionally, empirical results have verified that impact fee adoptions are influenced by the policy implementation decisions of neighboring localities (Jeong, 2006). And 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 rescinded, or at least reduced, their impact fee levies (Duncan Associates, 2010). These 'rollbacks' have been particularly common in California and Florida, where programs are pervasive and high profile. While somewhat predictable, this response is not grounded in sound reasoning. There is no reason to believe the presence and magnitude of most construction related externalities are a function of the business cycle. In addition to an inconsistency with efficiency concerns, rollbacks also compromise equity. Otherwise similar developments are treated very differently based only on whether or not they occurred before, during, or following the rollback.

Conclusions

Development impact fees have rapidly grown in popularity over 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 externality that would exist if infrastructure expansions were financed entirely through property tax revenues. The impact that new development has on a community, however, goes well beyond immediate budgetary considerations. In particular, development can result in environmental externality effects borne by both current and future residents. By our definition these projects represent non-sustainable development. Economic theory demonstrates that, under many conditions, the optimal policy response to negative externalities is to directly impose a tax on the offensive activity. In this paper we have argued that development impact fees can be tailored in such a way to accomplish this in most instances.

However, the legal distinction between taxes and fees must be kept in mind. Impact fees that are currently collected are most frequently used to finance the capital facilities necessitated by new development. As such, they must satisfy the rational nexus test. This test requires (1) a clear connection between new growth and the required public capital, (2) fees that are

proportional to the costs of providing the new capital, and (3) the payer of the fee benefit from the new capital. If impact fees are to be expanded to internalize the other types of negative externalities we have associated with new development, the rational nexus standards will likely become more difficult to satisfy. Hence, one challenge facing the approach we have advocated would be the significant attention to detail/design that would need to characterize any fee program that stood a chance of satisfying the rational nexus test. Alternatively, courts could revisit the rational nexus test in efforts to create a revised version with lower standards, recognizing the fact that the environmental impact of new development has a much larger and potentially less well defined footprint than its fiscal impact. For example, many of the negative externalities we identified operate at the regional level rather than at the jurisdictional level.

Another challenge associated with the approach we have advocated is that, to successfully achieve goals related to both equity and efficiency based concerns, accurate measurement of the various negative externalities associated with new development is required. This is easier said than done. Our recommendation for future research, therefore, is careful quantification of the effects, both positive and negative, that today's development has on both current and future generations.

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TABLE 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**
Non-conforming land uses	Occur immediately and last over time if competing activities both persist	Generally highly localized	Usage-based zoning, legal institutions, flexible impact fees for rezoning and variance cases
Open-space amenities	Primarily dynamic	Generally highly localized	Impact Fees, Local
Congestion externalities	Effects occur immediately and extend over time	Most relevant at the regional level	Impact Fees, Local and Regional
Compromised Local Public Infrastructure	Effects occur immediately and extend over time	Typically local but may extend to the region level	Impact Fees, Local and Regional
Environmental damage	May accrue immediately then dissipate (chemical spill) or cause little immediate harm but build over time (greenhouse gases).	Varies from primarily local (e.g., sulfur dioxide) to global (e.g., carbon dioxide)	Impact Fees, Local and Regional. Carbon emissions markets from higher order governments for global pollutants