

Leapfrogging, Urban Sprawl, and Growth Management

Phoenix, 1950–2000

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ABSTRACT. Through a case study of Phoenix, Arizona, this paper examines how urban sprawl is linked to opportunities for capital gains. It focuses on “leapfrogging,” in which developers skip over properties to obtain land at a lower price further out despite the existence of utilities and other infrastructure that could serve the bypassed parcels. The paper examines patterns of growth since 1950 and planners’ efforts to structure that growth. It discusses two programs that addressed consequences of leapfrogging: development impact fees to help pay for infrastructure costs of new development and an Infill Housing Program to encourage residential development on vacant land. It concludes with a brief discussion of the future of growth management in Phoenix.

I

Introduction

CHANGES IN THE BOUNDARIES BETWEEN CITY AND COUNTRY often occur in discontinuous leaps, rather than through a smooth and steady process of outward expansion. Developers may skip over properties to obtain land further out, leaving vacant tracts behind. This process, called leapfrogging, is one manifestation of the broader phenomenon of urban sprawl. Bradford Luckingham noted in his book *Phoenix: The His-*

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tory of a Southwestern Metropolis (1989, p. 193) that 40 percent of the land within the city of Phoenix was vacant in 1980. In part this reflected the city's aggressive annexation policy which increased the size of the city from 17 square miles in 1950 to 330.59 square miles by 1980 (and further to 473.215 square miles by 2000) (Wenum 1970, p. iv; Maricopa Association of Governments 1993, p. 5; City of Phoenix 2000a). Leapfrogging occurred beyond the city limits into other parts of Maricopa County as well.

As cities have expanded, urban sprawl has evoked concerns about environmental degradation and loss of open space and farmland. A vast literature on urban sprawl seeks to identify its causes and to assess its costs and benefits.¹ Leapfrogging is identified as one form of urban sprawl, which also includes scattered development, strip or ribbon development, and continuous low-density development.² A primary motivation for leapfrog development is lower land costs in outlying areas. Capital gains are a crucial component of a developer's return.

His success depends on buying land cheap, and selling it dear. Everything else that he buys is purchased in a national market and at price levels over which he has little influence. But he can leapfrog, buy and develop cheap land, mount an adequate advertising campaign and persuade prospective home-buyers to share with him in the anticipated capital gain. His marketing and management skills are focused on land value appreciation. He succeeds only if he can suburbanize the countryside (Raup 1975, p. 374).

While outlying areas are not the only places developers can succeed, such areas often have clear advantages. Land prices for vacant parcels closer in may be driven up by expectations of price appreciation and hopes of speculative gains to be made when the parcel ultimately is developed (Clawson 1962; Harvey and Clark 1965; Sargent 1976a).³ Large parcels of land are more likely to exist in outlying areas or to be easier to assemble. Other complications of infill development are less likely to be present, such as contaminated sites, poor perceptions of inner-city neighborhoods, or the need to negotiate with neighborhood groups, although surrounding property owners do in some cases mobilize against leapfrog development. "Developers say it is far easier to work with a vast tract of empty land at the city's periphery than to weave new homes into older neighborhoods" (Pitzl 1996a).

In addition to economic forces such as rising incomes and technological changes affecting industrial location, government programs and subsidies contribute to urban sprawl. Low-density suburban growth has been promoted by the operation of federal home mortgage loan programs, transportation subsidies favoring the private automobile, subsidization of infrastructure such as waste treatment systems, and federal and local tax policies (Raup 1975; Jackson 1985; Ewing 1994; Burchell et al. 1998). In many cases developer and homebuyer participants in the land market are not confronted with the full social costs and benefits of their decisions, which can lead to inefficient use of urban-fringe land (Archer 1973). In the specific case of leapfrog development, local government's role is perhaps most visible in rezoning decisions to allow residential, commercial, or industrial development on previously agricultural or undeveloped land and in decisions to extend infrastructure to outlying areas.

Section II below examines growth patterns in Phoenix from 1950 to the present with particular emphasis on the phenomenon of leapfrogging. It includes discussion of how planners have sought to structure the city's growth. Sections III and IV examine the two programs set up by the city of Phoenix that most directly addressed consequences of leapfrog development. In 1987 an ordinance was adopted to institute development impact fees requiring developers to pay some of the costs of providing infrastructure in areas of new development. The Infill Housing Program created in 1995 sought to encourage residential development in vacant areas within the city that had been bypassed. Section V concludes the paper and briefly describes recent legislative action in Arizona and the citizens' initiative that could affect the future of growth management in Phoenix and the rest of Arizona.

II

Growth Patterns in Phoenix

PHOENIX PROVIDES AN INTERESTING AND IMPORTANT CASE for studying the phenomenon of leapfrogging.⁴ Now the sixth largest city in the United States, it has grown very rapidly in recent decades. The population of Phoenix increased from 106,818 in 1950 to 439,170 in 1960, 584,303 in 1970, 789,704 in 1980, and 983,403 in 1990 (U.S. Bureau of the Census

1993, p. 593). By 1999 it stood at 1,240,775 people, more than a ten-fold increase since 1950 (Maricopa Association of Governments 1999). Maricopa County's population grew from 331,770 in 1950 to 2,122,101 in 1990 and it had the largest net increase of population between 1990 and 1997 of any county in the United States (U.S. Bureau of the Census 1993, p. 82; Maricopa Association of Governments 1998, p. 1). By 1999 Maricopa County had 2,913,475 residents (Maricopa Association of Governments 1999).

Observers of Phoenix's urban development began commenting on its discontinuous character soon after the wartime growth of the 1940s accelerated in the 1950s. Listed third among the major findings of a 1959 study was the following:

The Phoenix Urban Area contains an unusual amount of undeveloped land, about 43,385 acres. Intermittent vacant parcels exert adverse economic effects on developed property and have disrupted the continuity of streets and utilities making public service more expensive and less efficient (Advance Planning Task Force 1959, p. i).

The Task Force argued that leapfrogging had resulted in unstable property values and called for positive land development policies to prevent continued scatteration of urban development throughout the Valley (Advance Planning Task Force 1959, pp. 4, i, 17, 28, 11, 14).

A 1965 study pointed out the large amount of developable land available in its Greater Phoenix study area, including "startling large acreage figures" for small parcels in particular sub-areas.

By-passed land in small parcels of 40 acres or less is very much in evidence. Such parcels are widely distributed throughout the urbanized area and often exist in the midst of highly developed adjacent land. The comparatively small size of these by-passed parcels makes them both a problem and an asset to the community—an asset because they provide land for "filling-in" developments which may be sorely needed; and a problem because, by their very nature, they become a source of interminable requests for zoning changes and they are almost immune to public influence under present subdivision regulations (Western Management Consultants, Inc. 1965, p. 231).

The small parcels often had qualitative features making them difficult to develop, such as irregular shapes, narrow frontage, shallow depths, and unfavorable juxtaposition to other development. However, the

study pointed out that a considerable amount of infilling did occur during 1960–1964 after a period of more extensive growth from 1956–1960. Strip development along major trafficways connected “isolated islands of low-level development”—presumably the outcome of previous leapfrogging—with the main body of urban development (*ibid.*, pp. 234–236).

Although discontinuous development already had been occurring, a change appeared around 1970. The City of Phoenix Planning Department described 1970–1990 as a phase in which “residential growth . . . began to rapidly leap out into what had been more remote parts of the valley” (City of Phoenix Planning Department 2000). Growth was no longer largely a Phoenix experience; it went over the North and South Mountain and out to the east and west valley (City of Phoenix Planning Commission 1994, p. 4). Planned communities in outlying areas began to proliferate. By 1972 Greater Phoenix had sixteen major planned communities ranging in size from 640 to over 10,000 acres in various stages of development. Only seven had existed or been in process before 1970. New developments included Fountain Hills, 19 miles northeast of Scottsdale; Rio Verde, some 26 miles northeast of Scottsdale and 10 miles east of Reata Pass; Sun Lakes, seven miles from Chandler, as well as others. Only four, including Dobson Ranch and McCormick Ranch, were less than five miles from the edge of metropolitan Phoenix. Most of the sixteen communities were in the jurisdiction of Maricopa County although subject to later annexation (Sargent 1973, pp. 2, 7–8, 57–90).

The planned communities were themselves examples of leapfrog development, but also could contribute to two other forms of urban sprawl—strip or ribbon development along major transportation routes and continuous low-density development—by serving as foci of growth corridors. Moreover, while they offered many amenities and might be very well-planned internally, the early planned communities were not part of larger plans for the region as a whole and their existence could complicate later planning efforts (Sargent 1973, pp. 39–41). A key issue in terms of their implications for ribbon development and environmental damage from automobiles was whether the planned communities would be self-contained with a balance of jobs

and housing (i.e., genuine “new towns”) or would entail long journeys to work. Few of the early planned communities appeared to have the potential to be self-contained.

In later decades these questions surfaced in controversial development cases such as the Belmont case in 1991. Belmont’s Development Master Plan proposed placing approximately 150,000 people at a site about 35 miles west of the incorporated boundary of Phoenix. A large number of jobs on-site and a high degree of self-containment were projected, although the proposal also called for several freeway interchanges and several connections with the Sun Valley Parkway, which might be expected to lead to increased dependence on the automobile and on Phoenix. County Supervisor Carole Carpenter voted against approval of the Development Master Plan on the grounds that

This is not leap frog development; I think it’s leap frog olympics, and I frankly believe that this will not be a self-contained community. I have not seen a community, any community, in this valley which is self-contained in the sense that the jobs are provided on-site, and that the jobs are such a good match for housing and employment interests that people stay on-site. I believe there will be, if this actually is built, long commutes. I believe if there are long commutes that clearly will impact air quality in this valley, and I have very strong concerns about the air quality in the valley already (Maricopa County Board of Supervisors 1991).

Supervisor Carpenter and others also were concerned about depletion of the aquifer in that area. Supervisor Bayless and Chairman Freestone, however, voted in favor of the plan, which passed 2–1. The Belmont development, however, was not built.

Anthem, another planned community about 35 miles north of downtown Phoenix, has begun development. Its master plan for a community of 50,000 people also was approved by the Maricopa County Board of Supervisors (in 1995) despite considerable opposition. Editorials in the *Arizona Republic* and *Phoenix Gazette* endorsed the proposal, arguing that growth was inevitable and that the intensity of the development would allow the developer, Del Webb, to contribute to infrastructure and services in ways that would not be possible with a continuation of the “one-lot-per-acre” pattern which aggravated the problem of urban sprawl (*Arizona Republic* 1995; *Phoenix Gazette*

1995). The editorial in the *Gazette* added, however, that “Frankly, we are concerned that the development 12 miles north of Phoenix boundaries, so far beyond existing residential developments, might undermine the city’s plans to encourage infill in mature urban areas.” The first 1,300 of 14,000 planned homes began to be occupied in the summer of 1999. Demand for the houses was strong; at the grand opening 7,000 people showed up in a day and about 1,000 lots were sold in a week. The aim is for a retail center, offices, and a hospital to provide employment for residents but toward the end of its first year most people were commuting (Morrison 2000). The I-17 corridor connecting Anthem to Phoenix has been identified by Phoenix city planners as an area into which growth is to be channeled, which distinguishes Anthem from some other planned community developments. Sierra Club spokespeople and other critics remain worried about environmental and other consequences of growth in outlying areas.

Passage of the Arizona Groundwater Management Act in 1980 made leapfrogging to remote areas more difficult although not impossible. The legislation required developments in Active Management Areas to demonstrate that they had a 100-year assured supply of water without contributing to decline in groundwater tables. Developers could no longer simply drill a well and service their remote development with a private water company since this would not demonstrate a 100-year supply. In most cases they would need to rely on municipal infrastructure to obtain access to an assured supply. The Anthem case was an exception. Del Webb, a very large developer, arranged to lease water rights from the Ak-Chin Indian Community which had rights to Central Arizona Project water and to build a pipe system to get the water.

Other large scale developments, not all of which were planned communities, began or continued to build as growth picked up in the mid-1990s after the real estate slump of the late 1980s and the recession of the early 1990s. By 1997 21 large scale developments, each with more than 1,000 acres of land, were under construction and another 10 proposed in the Phoenix urban area. As in earlier years, they were found primarily on the urban periphery. Developments under construction included The Foothills to the south, Estrella to the southwest, Sun City Grand to the northwest, and Desert Ridge to the northeast (Maricopa Association of Governments 1998, p. 20).

Phoenix city planners described a third phase of growth after 1990 in which development went out into new territories. Desert Ridge was viewed as one of the keystones (City of Phoenix Planning Commission 1994, p. 4). Residential growth from the mid-1990s continued at the edge of the valley's urban area but was more compact than in the past. It was anticipated at the end of the 1990s that as construction reduced the number of vacant sites with streets and water, new residential growth would move into outlying areas lacking this infrastructure. This growth also would be located beyond the traditional commute shed for employment in the central valley (City of Phoenix Planning Department 2000).

While many criticized Phoenix's leapfrog development into farmland or desert and were alarmed at the urban sprawl which, according to a series in the *Arizona Republic*, was eating up "an acre an hour" of Valley land (Ingley 1994), not all saw these phenomena as a major problem. Gammage (1998, p. 61) argued that Phoenix had little of "the classically derided 'leapfrog' phenomenon" and stated that "metropolitan Phoenix has a cleaner edge than most American cities" (Gammage 1999, p. 68). Rex (1998, p. 55) pointed out that "a certain amount of leapfrog development is a natural feature of development" and argued that in rapidly growing western cities such as Phoenix, unlike slow-growing eastern or midwestern cities, bypassed land usually is developed fairly quickly and newly growing areas do not lack services for long.⁵ Phoenix has always had a very strong pro-growth orientation and even in the mid-1970s when anti-growth forces were growing in other cities its citizens remained relatively unconcerned (Gottschalk 1974). Sargent (1976b) characterized the situation as a conflict between "frontier values" and effective land-use control.

Recent polls indicate much greater citizen dissatisfaction with consequences of leapfrog growth and urban sprawl and there is a growing concern with the question of who should bear the costs of growth (Morrison Institute for Public Policy 1999; Guillory 1998). The development impact fees discussed in section III below were one response to this question, although as Gammage (1999, pp. 128–136) indicated, they are complex and not a panacea. Moreover, there remains a problem of the gap in timing between when infrastructure is needed and when tax and impact fee revenues are generated.

Concerns about leapfrog development and efforts to structure Phoenix's rapid growth are reflected in planning documents produced by the City of Phoenix, Maricopa County, the Maricopa Association of Governments, and other individual communities within the region. Among the themes which emerged clearly were "orderly and appropriately timed development" outward from a core, "efficient use of infrastructure," and "economy in the provision of municipal services." Jobs/housing balance, frequently not present in leapfrog developments, became an important goal. By the 1990s the preservation of desert open space also was a priority.

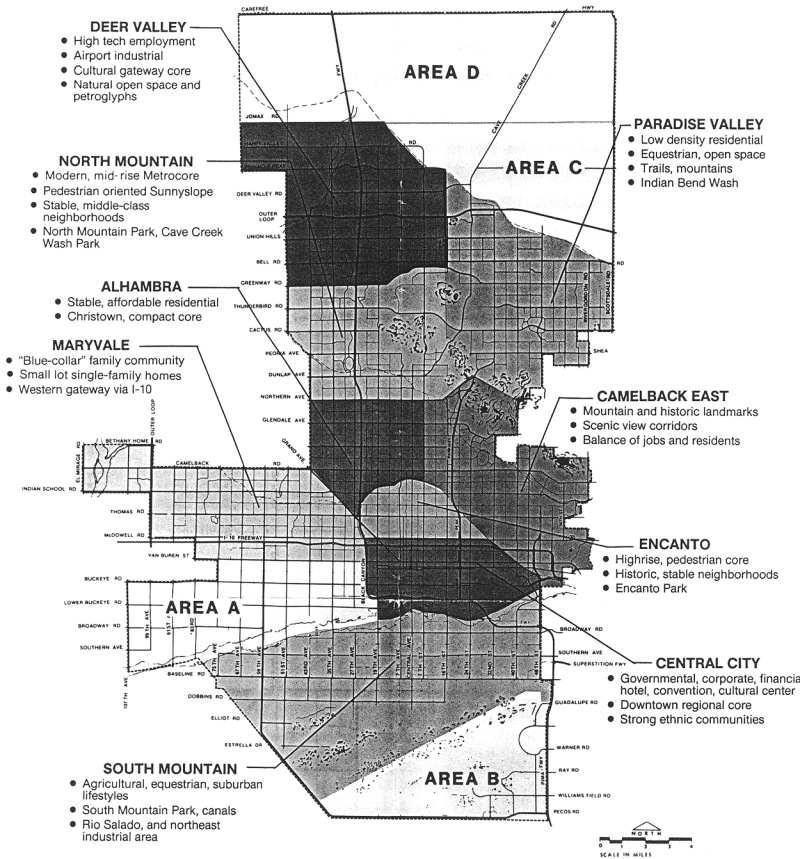
The current General Plan for Phoenix (now under revision) was adopted in 1985. It was based upon the urban village concept adopted in 1979 in the *Phoenix Concept Plan 2000*. Urban villages, each with a core, gradient, and periphery, were to contain a variety of housing, jobs, stores, and recreational and educational facilities and to be identifiable communities within the larger city. Nine villages and four Peripheral Areas (A, B, C, and D) were defined (see Figure 1). Peripheral Area A was west of I-17, between Maryvale and South Mountain Villages; Peripheral Area B was west of I-10, south of South Mountain Village; Peripheral Area C was northeast of Deer Valley and Paradise Valley Villages; and Peripheral Area D, added later, was north of Area C and Deer Valley Village. Peripheral Areas C and D often were described as the land above the Central Arizona Project Canal. These four Peripheral Areas included a considerable amount of land outside the city limits. They were areas in which the city sought to influence patterns of growth and where the issue of financing new infrastructure would be important (City of Phoenix 1985). In later years the Peripheral Areas were included in urban villages as additional villages were designated and some existing villages redefined.

The 1979 *Concept Plan* had been based upon the work of eight Urban Form Directions Committees. One was a Land Use Committee that identified "structuring future growth" as an important goal.

. . . as opposed to allowing spontaneous growth and continued sprawl, new growth will be encouraged to take place within the existing city fabric at planned locations or nodes and will be strongly discouraged in other locations. New development not located within the existing fabric of city ser-

Figure 1.

Phoenix Urban Villages and Peripheral Areas, 1989



Note: For a more precise eastern boundary for Area D see the land use map in City of Phoenix (1989).

Source: City of Phoenix (1989).

vices will be discouraged, and this fabric will not be extended until development of the desired intensity within the existing fabric has been obtained (Urban Form Directions Committees, 1975, p. 11).

The *General Plan for Phoenix, 1985–2000* called specifically for the development of existing zoned and vacant land before granting additional rezoning and stated that rezoning should occur only when the proposed land use could be developed “within the capacities of existing infrastructure and public facilities and services” (City of Phoenix 1985, pp. 8, 67). General plan elements subsequently were developed for each of the four peripheral planning areas. Their goals included providing supporting capital facilities in an orderly and efficient manner (Quay 1993). The plan for Peripheral Areas C and D stated that “remote (leap frog) patterns are discouraged” (City of Phoenix Planning Department 1987, p. 5).

In developing its Comprehensive Plan Maricopa County explicitly addressed the problem of leapfrogging. Existing Area Land Use Plans for individual areas within the county contained goals and policies intended to discourage leapfrog development and urban sprawl. An early version of the Comprehensive Plan’s Goals and Policies stated that “new urban zoning shall be within one mile of existing urban development.” According to Commissioner Jones, this policy was intended to prevent leapfrog development, especially with urban densities. The proposed policy proved to be controversial, however. At a public hearing on the Goals and Policies Ms. Jackie Guthrie of Cornoyer Hendrick Associates requested that the phrase above be expanded to state “unless within an approved Development Master Plan.” Commissioner Hawks noted that there was concern that the policy as originally proposed might prohibit a relatively large self-sustaining project (satellite community) (Maricopa County Planning Commission 1992).

The policy subsequently was modified with additional goals and policies specifically to address development master plans (for planned communities to be built in the county) to be developed for later inclusion in the Comprehensive Plan (Maricopa County Planning Commission 1992; Maricopa County Department of Planning and Development 1993a). The growth guidance policy language ultimately approved stated that “New urban zoning shall be in close proximity to

existing urban development or be consistent with the goals and policies of approved Development Master Plans” (Maricopa County Department of Planning and Development 1993b). In 1993 a Large-Scale Development Working Group was formed to develop goals and policies relating to large-scale developments in rural areas.

Infill development also has been an explicit objective of county and regional planning. The land use element of Maricopa County’s Comprehensive Plan ultimately adopted by the county listed “Promote infill development” first among its objectives (Maricopa County 1997, pp. 26–29). The *Desert Spaces* plan of the Maricopa Association of Governments (MAG) included infill development as the last of its eight objectives (Design Workshop Inc. 1995, p. 8). MAG’s *Valley Vision 2025* stated, “We envision a future where the edges of the developed area reflect regional and local goals to promote infill, support revitalization of center city and downtown districts, spend government funds efficiently, and protect existing public and private investment in civic infrastructure” (Maricopa Association of Governments 2000, pp. 164–165). Under its “place” theme it included as part of its vision a move from “sprawling, undifferentiated development” to “high quality, distinctive development” and “preserving landscapes, open space, culture” (Maricopa Association of Governments 2000, p. 173). MAG’s 1995 Urban Form study did not recommend a preferred urban form for the region but it did point out that infrastructure costs would be lower if new development could be located near existing facilities with unused capacity and it concluded that “leap frog development, if allowed should be required to pay for the extra cost of extending infrastructure” (BRW, Inc. et al. 1995, pp. 16, 14, 2).

The aim of orderly expansion within the fabric of existing city services was not easy to attain. As described above, rezonings were not limited to cases where existing infrastructure already was in place. As growth continues to extend into new areas, current planning efforts are focusing on channeling it into defined locations. In 1994 Phoenix began to implement a set of growth concepts called the Strategic View of Growth. Six emerging growth areas were identified to absorb new population: Central Corridor, Estrella, Laveen, Baseline, Desert Ridge/Paradise Ridge, and the North Black Canyon Corridor (City Council Report 1998; City of Phoenix Planning Department 2000). The

North Black Canyon Corridor Concept Plan, adopted in 1997, included a new planning tool: an infrastructure limit line. Water and sewer infrastructure would be extended and development encouraged only within the limit line. The limit line would be reviewed by the City Council after either the development of 65 percent of the growth area or the passage of ten years. Employment growth within the Corridor would be encouraged to promote jobs/housing balance and reduce commute trips (City of Phoenix Planning Commission and Planning Department 1997, pp. 19–20; City of Phoenix Planning Department 1999). The Baseline Area Master Plan, approved in 1996, highlighted the Baseline Road corridor near South Mountain Park as a “skipped over” area that could be a key location for infill and an alternative to further extension into outlying areas. The hope was that residential development in the Baseline area would promote job locations in the central city near the airport and the inner-city freeway system, although concerns about crime and schools were noted (City of Phoenix Planning Department [c. 1997]; City of Phoenix Planning Commission and Planning Department 1996, p. 4).

Although planning documents had sought to address problems of leapfrogging and urban sprawl since the 1960s, specific policies and programs were much slower to emerge. Luckingham (1989, p. 193) noted that in the late 1970s “[Mayor] Hance and other city officials discussed offering incentives to developers to build on leapfrogged vacant land, but little was accomplished.” In the 1980s and 1990s Phoenix did create two programs relating to consequences of leapfrog growth: development impact fees and an Infill Housing Program. These programs are discussed in sections III and IV below.

III

Development Impact Fees

THE DEVELOPMENT FEE ORDINANCE (G 3040) was adopted by the Phoenix City Council on July 22, 1987. It provided for development fees to help finance public facilities, stating that “new development should pay for itself by assuming its fair share of the cost of providing necessary capital facilities” (City of Phoenix 1987). Fees would be applied in areas for which specific infrastructure financing plans (SIFPs) had been prepared

to project future infrastructure needs in eleven categories: equipment repair, fire, libraries, major streets, storm sewers, parks, police, solid waste, storm drainage, wastewater, and water. These areas were to include the Peripheral Areas and potentially other planning areas in the city. A schedule for adoption of SIFPs, first for Peripheral Areas C and D and then for A and B, and a methodology for calculation of the development fees were included in the ordinance (City of Phoenix Planning Commission and Planning Department 1986, 1987).

Much more limited fee ordinances had been adopted in 1981 and 1982 for sewer and water projects, respectively. In each case a residential development occupational fee and a commercial and industrial development occupational fee were established to recover part of the capital cost from customers receiving service. Fiscal difficulties faced by the city during the mid-1980s were one of a number of economic and political factors that contributed to the adoption of development impact fees. The immediate trigger was a proposal for a large master planned development (Tatum Ranch, originally Continental Foothills) north of the city in an area lacking infrastructure. The arrangements worked out for the Tatum Ranch case formed the basis for the subsequent development impact fee program although they differed in certain respects.⁶

In March 1986 the City Council created a Fiscal Impact Subcommittee to estimate public costs of new development on vacant lands and in peripheral areas and to determine techniques of financing them. In July the Subcommittee endorsed the conceptual approach to infrastructure financing presented in a consultant's report and proposed that staff proceed to prepare an infrastructure financing plan for selected portions of Areas C and D, specifically including the Continental Foothills development (Burke, Bosselman & Weaver 1986; City Council Report 1986). At Mayor Goddard's recommendation a 15 member ad hoc citizen's task force was established to assist and advise the Fiscal Impact Subcommittee.

The task force specifically addressed leapfrog developments in its January 1987 report, criticizing them for the "inordinate fiscal burden" they placed on the city and for the way such projects "interfere with the development of the City in an orderly, planned way by producing undesirable and unmanageable urban sprawl" (Fiscal Impact Advisory Task Force 1987). It cited the Tatum Ranch project as an example and

proposed the idea of a leapfrog cost premium to discourage such developments in the future. The methodology ultimately developed for calculating development impact fees did incorporate an amount for any extraordinary costs necessary to extend infrastructure to new development from the developed portion of the city.⁷

By April 1987 the Subcommittee had produced recommendations which included a proposed phase-in of the development impact fees over six years “to soften the impact of the new system on developers” (City Council Report 1987a). Comments had been received from the Home Builders Association of Central Arizona and from SunCor (the developer of Tatum Ranch after 1986 when it purchased the property from the Amcor Investment Corporation associated with Charles Keating) and city staff had prepared responses to their concerns. In May the City Council adopted the concept establishing a methodology for determining development fees. Further analysis by staff and discussions with the Homebuilders Association, SunCor, Steve Earl, and Mountain West produced amendments to the draft ordinance, one of which altered the language defining “extraordinary costs” from “those costs of providing capital facilities to a particular development project that are additional to the ordinary average cost of those capital facilities because of the distant location of the development project from existing capital facilities” to “those additional costs of providing capital facilities to a particular development that are incurred sooner than shown in the specific infrastructure financing plan because of the distant location of the development project from existing capital facilities” (City Council Report 1987b). After adoption of the ordinance in July work proceeded on the SIFPs, which were adopted for Peripheral Areas C and D in March 1988, for Peripheral Area A in October 1988, and for Peripheral Area B in May 1993 (City of Phoenix Planning Commission and Planning Department 1988, 1993).

In September 1993 the idea of suspending development impact fees in Peripheral Area A (the southwest peripheral area) was raised. Planning Department staff requested the Planning Commission to initiate an amendment to the Area’s SIFP, which would allow an opportunity to examine the area’s recent growth patterns and to assess the impact of the program on the area during the past five years (Quay 1993). The conclusion was that in Area A the program was not work-

ing. There had been little to no interest in residential development in Area A, in or out of the city; residential projects were further west. Commercial and industrial properties had paid the fees but were becoming resistant to doing so and it had cost more to administer the fee than had been collected (Subcommittee on the Economy 1994). Concern was expressed that “desired growth and development might in fact be stifled by the imposition of the development impact fees” (City of Phoenix Planning Department 1994).

Not all agreed that growth in Area A was desirable. One citizen argued that impact fees originally had two purposes—financing infrastructure and discouraging leapfrog development—and was concerned about the message that would be sent if fees were suspended. Councilman Rimsza, however, viewed Area A as an infill area rather than an area in which growth should be discouraged (Subcommittee on the Economy 1994). The collection of fees was suspended in Area A although they later were reintroduced in the western portion of Estrella, the Phoenix urban village that approximately coincided with the former Area A, after substantial residential development had been approved.

Beginning in 1994 a major review of the development impact fee program was undertaken which resulted in refinement of several aspects of the program and an increase in fees. The existing fees for Areas C and D had not been reviewed and updated since their establishment in 1988 because of the lack of development in those Areas. But as growth picked up in the early 1990s a more systematic approach to the development impact fee program was felt to be necessary. Work was undertaken to review the equivalent dwelling unit (EDU) factors used to calculate the fees and a more complex structure was adopted. The EDU factors take into account the different demands that different types of facilities (e.g., single family homes vs. multifamily vs. nonresidential uses) place on infrastructure. Other enhancements were related to (1) socioeconomic projections used to estimate future infrastructure needs, (2) offsets for alternative revenue sources used to pay for infrastructure, (3) estimates of unit costs of capital facilities, (4) calculations of service levels, and (5) preparation of long range capital facility plans. Progress was made toward developing a system that was both fair and administratively manageable (Mee 1997).

Development impact fees were increased in 1995 and 1996 with the substantially higher fees to be phased in over a period of several years. Strong opposition to the fee increases was voiced by the Home Builders Association of Central Arizona when they were proposed in 1995 on the grounds that they would drive up prices and hurt the homebuilding industry, and the City Council decided not to implement the full fee schedule immediately (Jarman 1995). Amendments to the Development Fee Ordinance were passed in 1996 and specific infrastructure financing plans were updated or drafted for various areas in the late 1990s.

As of May 31, 2000 development impact fees were being assessed in Deer Valley, North Gateway, Desert View, Estrella, Laveen, and Ahwatukee Foothills Villages. In some villages fees were assessed in only part of the village and a given village could include several different fee levels. Single family residential impact fees ranged from \$2,112 (plus a \$136 administration charge) in Ahwatukee east of 19th Avenue to \$9,471 (plus a \$372 administration charge) in North Gateway inside Black Canyon Corridor. These fees assumed standard density, 5/8" or 1" water meter, 4" building sewer, and payment of \$600 Water and \$600 Sewer Development Occupational Fees (City of Phoenix Development Services Department 2000).

As the process of determining and administering development impact fees in Phoenix becomes more refined, three larger questions remain. First, how effective are the fees in deterring leapfrog development and promoting infill? To be sure, this was not the only—or perhaps even the primary—reason for their adoption and some commentators warn that the objectives of paying for costs of growth and discouraging growth are distinct objectives, perhaps not best met through the same governmental policies (Worden and de Kok 1998, pp. 188–189). As Gammage put it:

In devising mechanisms to pay for growth, we should not be disguising an effort to discourage growth, or to change its shape, density, or form. If we want to do any of those things, we need to honestly and fairly debate whether we want higher density, less commercial, slower development, or more open space, and reach a conclusion (Gammage 1999, p. 136).

The probability that fees will deter leapfrog development obviously increases as the fees themselves increase, other things being equal. Af-

ter the fee increases that began in 1995 fees in Phoenix came closer to covering the full costs of new development. However, higher fees raise two other issues that have been the subject of public debate in Phoenix and elsewhere (Arizona Town Hall 1996, p. x).

The first issue is affordable housing. Developers have argued that the development impact fees will be passed on to homebuyers, raising the price of homes they seek to buy and perhaps putting them out of the reach of many. The Fiscal Impact Advisory Task Force addressed this issue explicitly in its January 1987 report and concluded that a more likely outcome was that the effect would be shared between lowered land costs and somewhat higher house prices. It calculated a worst-case scenario in which the fees were doubled and added to home prices (the prediction of one homebuilder). With a \$3,000 fee the increase in the monthly mortgage payment for a 30-year level payments loan at 10 percent would be \$52.70 (Fiscal Impact Advisory Task Force 1987). Current fees in many areas of Phoenix are much higher and worry affordable-housing advocates (McKinnon 2000a).

The likelihood that fees will be passed on to homebuyers depends on a number of demand and supply factors including the sensitivity of demand to housing prices, market conditions and barriers to developers' entry, and landowners' behavior. In some situations housing prices could increase with homebuyers paying the largest share of the fees. Impact fees also could have a negative impact on lower-income families in multifamily housing projects by raising rents or delaying their construction (Worden and de Kok 1996, pp. 189–90). However, even in these cases there may well be better approaches to housing affordability than seeking to ensure it through the level of development impact fees.

The second issue raised by higher development impact fees is that of competition from nearby jurisdictions. Will desired development go elsewhere if it is required to pay more of the costs of infrastructure development in some locations but not in others? The Phoenix area has a long history of rivalry among its municipalities, reflected in the annexation wars in which they sought increases in territory to ensure their sales tax revenue bases. The Fiscal Impact Advisory Task Force alluded to this issue of competition, asserting that "to the extent that Phoenix's new fees may exceed those of other Valley cities, we be-

lieve the disparity will be of relatively-short duration” (Fiscal Impact Advisory Task Force 1987). Other Valley municipalities did not immediately follow suit. After 1994 as the costs of growth became increasingly apparent, many did institute and later increased fees, although fees in Phoenix remained higher than in most. Some municipalities such as Queen Creek deliberately sought higher fees as a way to limit development and retain a rural character. But in 1999 Peoria exempted seven commercial developers from hundreds of thousands of dollars in impact fees that were scheduled to rise dramatically out of fear that projects would be withdrawn and future tax revenues lost (McGavin 1999; McKinnon 1999). Similar concerns about losing two supermarket chains’ distribution warehouses to Tolleson had been part of what led Phoenix to suspend impact fees in the southwestern part of the city in 1994 (Kwok 1994a).

IV

The Infill Housing Program

ON MARCH 8, 1995, THE CITY COUNCIL APPROVED ESTABLISHMENT of an Infill Housing Program for single-family housing on vacant land in the central part of the city and authorized \$100,000 in contingency funds for the program. The funds were to be used to reimburse city departments for lost revenues for fee waivers granted to applicants. The fee waivers included building plan review and permit fees and water and sewer development occupational fees. In addition, infill projects would be eligible for an expedited development process. The designated infill area lay between Cactus Road on the north and South Mountain. The program was intended to encourage development of additional quality owner-occupied housing, of a variety of styles, types, and price ranges, within this area. Housing design standards had been an important part of the discussions leading up to the program’s creation and its focus on owner-occupied housing was intended “to help deter blight and decay and to promote neighborhood stability through residents’ financial commitment and long term residency” (City Council Report 1995).

Earlier efforts to encourage infill had included density incentives and fee waivers but these efforts were relatively unsuccessful. Among its

programs were two the city initiated in 1981: the High-Rise Incentive District (allowing greater residential building height and density within the Central Corridor to stimulate residential and mixed commercial/residential projects) and the Residential Infill R-1 District (allowing greater densities to encourage new multi-family development within central Phoenix). Fee waivers were granted for items such as building permits, rezoning, zoning adjustment, abandonments, and certain water and wastewater fees. A small portion of south Phoenix that was regarded as needing development stimulation was also eligible for fee waivers. However, the High-Rise Incentive District did not produce any mixed use or residential projects and only two commercial projects had been completed by 1990. The incentives available for the Residential Infill R-1 District initially did not attract large developers; small-scale builders constructed low-quality buildings, some of which quickly fell into disrepair. By 1990 two large downtown projects had been constructed by major developers: St. Croix Villas and Renaissance Park. Discussion of possible infill strategies for Phoenix at that time noted several factors limiting its potential for infill, including a high housing vacancy rate, dispersed employment centers, lower land prices in outlying areas, and the lack of growth controls (City Council Report 1990; Real Estate Research Corporation 1982, pp. 61, 87).

As the city's economy recovered in the 1990s from the recent economic downturn, the prospects for infill came to look more promising. Infill was viewed as an alternative to costly peripheral growth. In 1994 Councilman Skip Rimsza wrote to the City Manager:

While it is exciting to see an upswing in our economy, we must be careful in how we plan for future growth. Even with fiscal impact fees, development on the outskirts of the City is taxing on our budget. It is imperative for the City of Phoenix to encourage infill projects where the infrastructure and services are already at a high service level recognized worldwide (Rimsza 1994).

An Infill Housing Task Force reported to the City Council in March 1994 and presented a list of concepts and possible incentives including fee reductions, expedited reviews, and code waivers, while pointing out that the proposed program would be costly and that funding sources would need to be found to compensate for lost fee revenues (City Council Report 1994a).

Concern about the potential revenue losses (as much as \$1.3 million to \$1.9 million a year) delayed City Council action on the recommendations but the Council was receptive to a more limited approach (Jarman 1994).⁸ Staff evaluated a pilot infill project of 27 homes in the fall of 1994 and recommended that it be funded. Seeking to emphasize potential cost savings if an existing or new resident chose a home in the infill area rather than on the fringe, the staff report pointed out that the current infrastructure cost to the city for each new home on the fringe was about \$6,000 after deducting payment of developer impact fees (City Council Report 1994b). Infill became “the defining issue” in the special mayoral election in October 1994. The election was won by Rimsza, who had promoted the idea of infill for many years but differed from other candidates in being unwilling to penalize owners who held vacant land for speculation by taxing them more highly (Kwok 1994b).

Stage I of the Infill Housing Program was approved by the City Council on January 17, 1995 subject to modifications by the Housing and Neighborhoods Subcommittee; the program received final approval in March. A 1995 Planning Department staff report outlined some of the challenges the program would face. The report took the view that “the large number of vacant parcels in Phoenix that have either been skipped over by earlier development or have been cleared of older structures but not yet reused is both a problem and an opportunity” (City of Phoenix Planning Department 1995, p. 2). Based on a survey of over 60 people including builders and developers, professionals associated with property development, neighborhood activists, City Council and Planning Commission members, and City staff in several departments, the report listed sixteen barriers to infill. The top five in the order in which they were ranked in the survey were crime and perception of crime, perception of schools as inadequate and/or unsafe, difficulty in finding and acquiring land suitable for development (due to multiple owners, unrealistic expectations and speculation that inflated land prices, and property not being on the market), perception of declining property values, and a variety of reasons for higher development costs including in some cases the cost of retrofitting infrastructure.

Interviews with developers identified availability of financing as a

major problem for some potential infill projects. Profit margins also could be an issue. One builder provided a cost assessment for a 1,500 square foot, \$80,000 infill house with a 4 percent profit margin (considered on the low end of the spectrum by home builder standards). Waiving city fees or reducing land acquisition costs by \$2,500 could increase the profit margin to as much as 7 percent, a profit margin easily obtained by a home builder on the periphery.

Bankers pointed out that "the infill market is 'totally separate' from the peripheral market. Developers who are building residential subdivisions on the periphery do not get involved with infill projects" (City of Phoenix Planning Department 1995, p. 16). Smaller companies within the Home Builders Association of Central Arizona supported the establishment of the Infill Housing Program but the Association's assistant director predicted that large builders would not be affected (Padgett 1995). This division largely has persisted up to the present. The Infill Housing Program has not primarily operated by inducing large builders to switch from peripheral to infill locations. Instead, its incentives went heavily to smaller nonprofits and/or homebuilders and to individuals.⁹ Some builders and developers specialize in infill projects as their niche.

By August 31, 1995, 49 applications had been reviewed. Thirty-two building permits had been issued, 5 applications had been rejected, and 12 applications were in the plan review process or awaiting issuance of building permits. The estimated construction value of the permits issued was \$3,718,785 and the average fee waiver per unit was \$1,975. As the program moved into its second year, the volume of applications exceeded expectations. Early in 1996 the City Council approved limits on the amount of the fee waiver for the building permit and the building plan review and on the number of houses within a project which could receive fee waivers. These actions were intended to maximize the use of the city's resources (City Council Report 1996). Throughout its operation the program has sought to target its efforts on projects that the market would be unlikely to produce without incentives. This, as well as concern about the program's costs, led to a desire to de-emphasize subdivisions in favor of individual units, although in 1999 subdivisions still constituted approximately 64 percent of all permits issued (City Council Report 1997; City Council Report 1999).

At that point the program had permitted 1,081 projects with an estimated construction value in excess of \$130 million. The average fee waiver was approximately \$1,700 although higher waivers could be granted. Modifications had been made and pilot projects were underway to address three categories of barriers to infill: regulatory requirements pertaining to public health, safety, and welfare, plan review times, and costs associated with city review (City Council Report 1999). For many applicants expedited building plan review and personalized service in the development process, rather than the financial incentives, had been the most important benefits (City Council Policy Session 1999).

During the life of the program larger tracts of vacant land in the central city were becoming more scarce and by the spring of 2000 the program's coordinator noted a migration south toward Laveen where vacant land was more readily available. A majority of the projects in what was by then an approximately 175 square mile designated infill area were located south of the Salt River (Doefler 1997; McKinnon 2000b; Fimea 2000). Preparation of an inventory of vacant parcels within the designated infill area to help developers locate eligible parcels had been envisioned as part of the program from its inception. There also was interest in identifying underutilized land. Dr. Elizabeth Burns of Arizona State University and her students have contributed to work on a database including the inventory and other information available through the city's Geographic Information Systems (GIS) Program (City of Phoenix Planning Commission and Planning Department 1995, 1996, 1997, 1998).

A total of 1,699 projects had been permitted by early 2000 and current fiscal year 1999–2000 funding for the program was \$530,000. An additional \$44,000 was requested for the remainder of the fiscal year (City Council Report [2000]) The maximum waivers available at that point were \$2,250 per house (\$1,000 for building plan review and building permit fees, \$1,200 for water and sewer development occupational fees, and \$50 for a fence permit if applicable) plus an additional \$500 per house/subdivision for development processing fees for zoning variance, abandonments, subdivision/lot splits, dedication of easements and rights-of-way, pavement cut surcharges, and building code modifications. The number of houses that could receive fee

waivers was limited to 12 units per subdivision (City of Phoenix 2000b).

The Infill Housing Program appears to be succeeding in many respects although it is difficult to know how much of the development associated with it would have occurred in any case without its incentives.¹⁰ But at its best the program could be only a partial solution to problems of leapfrogging and urban sprawl. Realistic advocates of the program recognized its limits from the beginning. From 1990 to 1994, more than 5,200 homes had been built each year outside central Phoenix (Pitzl 1996a).¹¹ Mayor Rimza warned against banking on central-city development to prevent sprawl. “In my wildest dreams, we wouldn’t build 5,000 infill homes in a year,’ he said. ‘It’s too difficult to do.’” (Pitzl 1996b). Instead, he thought 50 homes would be a “good year” and 300 would be a “home run” (Fischer 1996). Councilman Craig Tribken, Chair of the Housing and Neighborhoods Subcommittee, set a higher goal for the program which he believed had “major public benefits.” But even that goal was only 500 homes per year (Housing and Neighborhood Subcommittee 1994).

As noted above, the Infill Housing Program’s objectives were by no means confined to countering leapfrog development and urban sprawl. Promoting owner-occupancy and better quality housing in the central city also were important goals. Unlike some other infill programs, such as the widely-praised one in neighboring Tempe, Phoenix’s program did not have a strong commercial or mixed-use component nor did it attempt to stress higher-density development. Such efforts might not have succeeded. Robert Franciosi, a research associate with the Goldwater Institute, argued that “no one moves to Arizona to live in a twenty-story apartment building” (Franciosi 1997). Twenty-story apartment buildings are, of course, not the only possible form of higher-density development, although he is right that there are strong preferences in Phoenix for low-density forms. Unfortunately, even if new residential development were 50 percent denser than in nearby neighborhoods, developing all vacant residential land in the 1990 Phoenix urban area could accommodate only 9 years of population growth if it continued at the rapid 1990–1995 rate (as opposed to 6 years of population growth if existing densities were maintained) (Ellman 1997, p. 10).¹²

Conclusion

CONCERN ABOUT LEAPFROGGING AND URBAN SPRAWL in Phoenix appeared along with the extraordinarily rapid growth of the 1950s and continued in later decades. That concern coexisted with a strong commitment to growth and to individual property rights and “frontier values” that made land-use controls difficult to implement. Competition among jurisdictions within the region also undermined effective growth management (Berman 1998). Planners sought to structure the city’s growth and to ensure that orderly expansion and efficient use of infrastructure would occur, but it was not within their power fully to realize these goals. Effective growth management also was hampered by difficulties, not discussed in this paper, of integrating transportation planning and land use planning. Two programs were created that addressed consequences of leapfrog growth although each had other objectives as well. Development impact fees alleviated some of the fiscal strain caused by the costs of providing infrastructure in outlying areas. They also addressed the growing sentiment that new development should pay its own way. The Infill Housing Program sought to encourage development on vacant parcels that had been bypassed by leapfrog growth.

One of the lessons to be drawn from the history of leapfrog development in the Phoenix area concerns the difficulty of controlling such development (or urban sprawl more generally) with the planning and growth management tools available to the city of Phoenix during most of the period discussed in this paper. As discussed above, intentions embodied in land use plans were not always realized and rezoning decisions could contribute to leapfrog development and sprawl. The Arizona state legislature opposed other measures used by cities in other states such as schemes to tax vacant land. There also were limitations on what Maricopa County could do. The county, unlike the city of Phoenix, was not permitted to adopt development impact fees until very recently.

However, it is not clear to what extent responsibility for Phoenix’s growth patterns lay with inadequate tools as opposed to a lack of political will. Clearly some features associated with leapfrog development and low-density growth were desired by many Phoenix resi-

dents and builders opposed restrictions on these development patterns. Single-family homes were in demand although, as critics have pointed out, a desire for single-family homes is not necessarily identical to a desire for low-density sprawl development and single-family homes can be provided in other configurations. Relatively few types of housing options have been available in the Phoenix area, in part because builders are reluctant to take chances on types of development for which there is not a proven market.

It also is not clear to what extent leapfrog development per se has entailed or will entail negative long-run consequences for Phoenix, particularly if low-density development is a desired outcome. As noted above some of the negative consequences of leapfrog development diminish if vacant lands ultimately are filled in. At that point the question becomes one of the pros and cons of continuous low-density development (if the infill has been low-density) rather than of leapfrog development. Infill development may be at a higher density than development that would have occurred on those parcels without leapfrogging and some would consider this a desirable outcome. Phoenix's Infill Housing Program did not strongly encourage higher-density development, in part because of its emphasis on owner-occupied residential development. Also, in some cases higher-density infill development has been opposed by local residents. There has, nonetheless, been some increase in the overall density of Phoenix. It would be interesting to know more about the extent to which this resulted from higher-density development of previously skipped-over parcels, higher-density development in new subdivisions in more outlying areas, or both.

Certain undesired consequences of Phoenix's growth patterns have become increasingly evident, however, and changes in political will may result in significant changes in available planning and growth management tools. The Phoenix case provides several illustrations of the negative externalities that can be associated with urban growth. Air pollution is perhaps the most striking example. Phoenix has attracted national attention for its "brown cloud" and has been rated as having serious air quality deficiencies by the Environmental Protection Agency. Widespread dissatisfaction with traffic congestion, air pollution, loss of desert open space, and other consequences of urban

growth in Phoenix and other Arizona cities led to the introduction of a Citizens' Growth Management Initiative (CGMI) by the Arizona Center for Law in the Public Interest, the Sierra Club, and other environmental and community groups.

There is disagreement in the literature as to what extent the problems mentioned above are exacerbated by sprawl as opposed to more compact forms of growth. Various factors including the location of employment opportunities and the provision of transportation infrastructure play an important role, particularly for traffic congestion. Sufficient evidence exists, however, to convince many that urban sprawl is a serious problem and limiting sprawl is an explicit goal of the CGMI. Problems resulting from low-density, automobile-dependent urban forms also could be addressed by producing more energy-efficient vehicles and by requiring drivers to pay the full social costs associated with the types of vehicles, distances, and times of day that they drive, thereby internalizing externalities.

The CGMI did not initially obtain enough signatures to be put on the ballot, but another effort is under way at this time (July 2000) to get the CGMI passed in November 2000. One of its most controversial provisions is a call for ten-year urban growth boundaries around Arizona's cities and towns. It also stipulates that developers must pay full impact fees to cover the costs of public facilities for new projects except in infill incentive areas, requires that voters approve growth plans and major amendments, and includes an enforcement provision allowing any person to file a civil action alleging violations and seeking injunctive and other relief.

The CGMI evoked strong opposition and legislative action. Governor Jane Hull already had been interested in growth proposals and some segments of the business community put a high priority on blocking the CGMI. In 1998 a proposal by the Governor and legislators called "Growing Smarter" was passed, followed by "Growing Smarter Plus" in February 2000. This legislation takes a much less aggressive approach to urban growth and does not satisfy the proponents of the CGMI although it does address some similar issues. For example, the Growing Smarter Act required that cities and towns' plans have a cost of development element to identify policies and strategies regarding how development would pay its fair share of the

costs it generated. Growing Smarter Plus required that the land use element of plans identify programs and policies to promote infill and allowed the designation of infill incentive districts where fees for the cost of additional public facilities could be reduced. There also were legislative and ballot measures pertaining to the acquisition and preservation of open space and the management of state trust lands. In the process of emergence of Growing Smarter more players entered the growth debate and the terms of that debate shifted (Melnick 1998). If the CGMI passes in November 2000, the actual practice of growth management in Phoenix will be dramatically altered as well.

Notes

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1. See Ewing (1994) and Burchell et al. (1998) for surveys of this literature. Burchell et al. (1998) included a critical assessment of the widely-cited but flawed 1974 report by the Real Estate Research Corporation, *The Costs of Sprawl*, and brief summaries of many subsequent contributions. There is no universally accepted or scientifically precise definition of urban sprawl. The term often is applied as a negative normative judgment. Views differ widely, however, as to whether urban sprawl constitutes a serious problem. See Burchell et al. (1998) for discussion of positive impacts that have been argued to result from sprawl in the areas of public/private capital and operating costs, transportation and travel costs, land/natural habitat preservation, quality of life, and social issues.

2. Leapfrog and scattered development result in a checkerboard pattern of land use in which vacant land alternates with developed land. Strip or ribbon development refers to linear spread, particularly of commercial land uses, along major transportation corridors. Critics argue that it results in longer

travel distances and greater automobile use, with negative environmental consequences. Continuous low-density development is most often associated with residential development of single-family homes on lots that opponents of sprawl regard as too large and as consuming too much land. Many writers treat leapfrogging and scattered development as synonymous; some distinguish leapfrogging as involving greater distance from existing urban development. Ewing (1994) defined leapfrogging as a type of scattered development that assumes a monocentric city. Since Phoenix is not a monocentric city, presumably he would use the term scattered development to describe the activity in the Phoenix area that others have called leapfrogging. Leapfrogging and scattered development frequently are regarded as inefficient in terms of travel requirements and the provision of infrastructure and public services. However, if discontinuous development is concentrated in new centers, the resulting polycentric form can be more efficient for large metropolitan areas by reducing trip lengths without producing excessive congestion (Haines 1986). Although Phoenix planners have attempted to encourage a polycentric form by the designation of urban villages and measures to promote jobs-housing balance (described below), Phoenix is not generally regarded as having fully attained the benefits of that form. Leapfrogging also is defended by some writers on the grounds that it preserves flexibility for future development and that if higher densities are allowed on infill parcels, leapfrogging may result in higher overall density than would have occurred if discontinuous development were prevented (Lessinger 1962; Ohls and Pines 1975; Ottensmann 1977; Peiser 1989; Altshuler and Gómez-Ibáñez 1993). For more complete and detailed discussion of negative impacts that have been argued to result from the various forms of urban sprawl see Ewing (1994) and Burchell et al. (1998).

3. These expectations may be unrealistic and the hopes disappointed. Moreover, if the growth rate of land values slows and speculators wait too long—i.e., if they wait until the rate of growth of their land's value is less than the interest rate—they will lose some or all of their gains (Fischel 1985, p. 265).

4. In this paper I focus primarily on leapfrog development, a type of sprawl that was especially important in contributing to the emergence of development impact fees and the Infill Housing Program. I also concentrate on the city of Phoenix and its programs although the phenomenon of leapfrog development occurred on a wider scale, affecting unincorporated territory and many of the other 23 incorporated cities and towns in Maricopa County. Some of these municipalities also have developed development impact fee and infill programs. This paper is an initial exploration and forms part of a larger research project on the history of urban growth and planning in Phoenix and neighboring cities.

5. Rex (1998) also provided an interesting analysis of the costs and benefits of growth to different groups, arguing (p. 53) that “the divergence of con-

tinued net benefits to the private sector and to certain individuals while the net benefits to the other groups are disappearing results in the growth of an area beyond the size desired by a majority of its residents.”

6. The question of why development impact fees were adopted in 1987 and not earlier is an interesting one that I am investigating as part of my ongoing research.

7. Some, although not all, infrastructure costs vary with distance and can be expected to be greater for leapfrog developments. In the case of water and sewer services, one of three components of costs—the costs associated with the delivery of services such as sanitary sewer lines—generally increase proportionally as distance increases. The capital costs of producing the service (in facilities with economies of scale and declining average costs) and the short-term costs of actually producing the good, or the maintenance and operation costs (e.g., the costs of processing sewage once it has been collected) generally are independent of distance (Nicholas et al. 1991, p. 50). Using data from a case study of a subdivision near Lexington, Kentucky, Archer (1973) found that leapfrog development two miles from the edge of the built-up area entailed large additional capital costs (\$234,681) for water, gas, telephone, electricity, and sanitary sewage, although he pointed out (p. 368) that “much of this was only a temporary additional cost because it was excess capacity in the utility network which would be used when the intervening land was developed.” Downing and Gustely (1977) estimated that for a 1,000 unit neighborhood the annual capital and/or operating cost of providing public services (police, fire, sanitation, schools, water supply, storm drainage, and sanitary sewers) per mile of distance from public facility site was \$68,498. Their data suggested that “for a subdivision located five miles from each of these facilities, annual incremental costs per household would be in excess of \$300” (p. 84). Altshuler and Gómez-Ibáñez argued that Downing and Gustely’s estimates for capital costs for water, sewage, and storm drainage overstated the effects of distance because they did not take into account economies of scale in central treatment plants. There also may be economies of scale in pipe sizes: “a community can economize in serving more distant neighborhoods if it has the foresight to install larger trunk lines when the close-in neighborhoods are developed” (Altshuler and Gómez-Ibáñez 1993, p. 73). Frank (1989) reanalyzed a number of earlier studies and found that ten miles of distance from central facilities and the major concentration of employment increased total capital costs of development for streets, sewers, water, storm drainage, and schools by almost \$15,000 per unit in a development with three dwelling units per acre. He also provided estimates of additional leapfrog costs associated with arterial roads and sometimes trunk utility lines needed to traverse vacant land within a community (as opposed to linking that community to distant central facilities).

8. The City Council appears to have focused quite heavily on the cost side

of the program at this point. Unless the fee waivers went only to builders who would have built in the infill area even without the incentives, the program would result in additional revenues as well as additional costs. Moreover, to the extent that the program succeeded in its goal of deterring blight and decay it might also reduce some costs resulting from blight that the city would have incurred in the absence of the program. There were, nonetheless, grounds for caution. First, some waivers might be granted for projects that would have been built anyway. Second, as noted above even in cases where new development ultimately pays its own way there is a problem of the gap in timing between costs associated with the development (including incentives necessary to induce it) and the revenues it generates. Finally, while conditions vary greatly depending on specific local circumstances, in many cases "development does not cover new public costs; that is, it brings in less revenue for local governments than the price of servicing it" (Altshuler and Gómez-Ibáñez 1993, pp. 77).

9. According to Mitchell Hayden, the Business Assistance Coordinator in the City Manager's Office in Phoenix, "over 70% of our projects are affiliated with subdivision developments while only 30% are individual owner/building type projects. We classify subdivisions as any project consisting of more than 12 lots. Within this 70%, many are smaller non-profits and/or homebuilders. Major home builders generally are developing in areas outside the infill boundary" (personal communication, June 23, 2000).

10. Ideally one would like to be able to compare what would have happened in the absence of the incentives with what did happen with the incentives in place. One approach would be to construct a model for this purpose. However, the data requirements for adequate models are considerable and the infill area is not one for which economic data generally are collected. Some similar issues arise in the evaluation of urban enterprise zones. See Rubin and Wilder (1989) for a discussion of these issues and an evaluation of the Evansville, Indiana enterprise zone based on an unusual availability of micro-level data from annual surveys of zone firms from 1983 to 1986. There is a large body of studies using economic models and other approaches to examine the effects of various economic development incentives (or disincentives, such as taxes) offered to business firms by states and local governments. The studies have produced contradictory results and the results are very sensitive to the assumptions incorporated in the models. See Bartik (1991) and Fisher and Peters (1998) for discussions of this literature.

11. The numbers are likely to have been higher in the later as opposed to earlier years of this period, as the economy recovered from recession and the single-family housing market rebounded from a 1990 trough. Single-family new housing units authorized in the Phoenix Metropolitan Area as a whole were 10,909 in 1990, 13,840 in 1991, 18,809 in 1992, 23,196 in 1993, and 28,224 in 1994 (AzStats 1996, p. 46).

12. Cities in the Valley differed in the 1990s in the extent to which development involved converting land to urban uses as opposed to being more of a filling-in process. In some communities such as Gilbert, Glendale, Scottsdale, and Surprise development entailed a significant amount of conversion of previously rural land to urban uses. Phoenix, Avondale, Chandler, Fountain Hills, Mesa, Paradise Valley, Peoria, and Tempe had lower land absorption coefficients, indicating more of a process of funneling additional population into existing urban land (Gober et al. 1998).

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