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### Managing Growth With Priority Funding Areas: A Good Idea Whose Time Has Yet to Come

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# Managing Growth With Priority Funding Areas

## A Good Idea Whose Time Has Yet to Come

Rebecca Lewis, Gerrit-Jan Knaap, and Jungyul Sohn

**Problem:** In 1997, the State of Maryland adopted a bold new approach to growth management based on a novel instrument: priority funding areas (PFAs). PFAs contain growth by directing state spending to areas designated by local governments and reviewed by the state government. Despite widespread acclaim and subsequent imitation, little is known about whether PFAs effectively contain urban growth.

**Purpose:** The purpose of this article is to evaluate the adoption, implementation, and performance of PFAs in Maryland in order to provide planners and policymakers with insights into their efficacy as instruments for managing growth.

**Methods:** First, we describe the statutory definition and mandated role of PFAs in state funding. Then, we describe the process used to create PFAs, the resulting pattern of targeted growth areas, the relationship between PFAs and local comprehensive plans, and the extent to which PFAs altered state spending. Finally, we examine the effects of PFAs on residential development patterns.

**Results and conclusions:** We find that PFAs have fallen short of expectations. The criteria used to establish PFAs produced boundary configurations that vary widely and are in many cases not ideally suited to managing urban growth. Ten years after their official designation, PFAs are not well integrated in land use decision making processes in many local jurisdictions. Finally, state agencies have not altered budgetary systems to monitor and guide the spatial allocation of funds and there is little evidence that after 10 years they have had any effect on development patterns.

In 1997, Maryland burst into the national spotlight on smart growth when its general assembly passed a package of bills called the Smart Growth and Neighborhood Conservation Initiative. Almost immediately, the state gained national recognition and earned several awards.<sup>1</sup> By creating a system for concentrating state spending in urban areas as well as using other economic incentives to contain urban growth, it seemed the state had found a way to promote smarter growth without usurping local land use control. It has now been over 10 years since Maryland's smart growth legislation was passed, but to date there have been very few analyses of the extent to which Maryland's acclaimed program actually works.

In this article, we examine in some detail the centerpiece of Maryland's approach to growth management: priority funding areas (PFAs).<sup>2</sup> These areas are designated by local governments and reviewed by the state and serve as target areas for spending by state agencies. PFAs have been the subject of much criticism and praise but little careful analysis. Toward that end, we

**Takeaway for practice:** Targeting state funds to promote compact growth is a conceptually sound approach to urban growth containment, as land is less likely to be developed if it is not served by public infrastructure. But, as with other planning tools, the key is effective implementation. If states want to contain growth by targeting state spending, they must change budgeting processes to ensure that funds are spent appropriately and that the level of state spending is large enough to make a difference.

**Keywords:** priority funding areas, urban containment, targeted state spending, growth management, Maryland

**Research support:** None.

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proceed as follows: First, we describe the statutory definition and mandated role of PFAs in state funding allocation. Then, we describe the process by which PFAs were created, the resulting pattern of targeted growth areas, the relationship between PFAs and local comprehensive plans, and the extent to which PFAs altered state spending. Finally, we examine the effects of PFAs on residential development patterns. We conclude by identifying the weaknesses in the PFA approach and offer suggestions for reform.

## Previous Research

Maryland's smart growth initiative occupies a prominent position in the literature on state land use programs (DeGrove, 2005). The era ushered in by Maryland's smart growth program has been dubbed the third wave of growth management, following the quiet revolution of the 1960s and the growth management era of the 1980s (Weitz, 1999). The Maryland program received numerous awards even before its various provisions took effect and became the principal legacy of its primary architect, former Governor Parris N. Glendening. Governors in New Jersey, Michigan, Maine, and Massachusetts instituted their own smart growth proposals modeled after portions of the Maryland program (Frece, 2008). Even the popularity and wide usage of the phrase *smart growth* can be attributed in part to the Maryland program. Key to its acclaim and widespread popularity was its reliance on economic incentives in place of regulations (Cohen, 2002). While the growth management programs in Oregon, Florida, and New Jersey relied heavily on regulations, concurrency requirements, and cross-acceptance procedures, respectively, Maryland seemed to have found a way to shape local land use policy without the state intervening extensively or usurping local land use control.<sup>3</sup>

## Research on Smart Growth in Maryland

While the package of smart growth bills passed in Maryland's 1997 legislative session contained a number of new tools, the Smart Growth Areas Act, which required the designation of PFAs, was clearly the central element (Frece, 2008). Shen, Liao, and Zhang (2005) and Shen and Zhang (2007) examined the effects of PFAs and *rural legacy areas* (designated for agricultural preservation and conservation) on land use conversion in Maryland from 1992 to 1997 and 1997 to 2002. Examining land conversions with two logit models to compare the two periods, the authors found that urban development was more likely inside PFAs and less likely in rural legacy areas after 1997, though the effects varied by county. Howland and Sohn

(2007) examined the effects of PFAs on investments in wastewater infrastructure and concluded that investments in water and sewer infrastructure were more likely inside PFAs than outside of them between 1997 and 2002. They also found that counties receiving more state funding were more likely to invest in water and sewer infrastructure projects inside PFAs than outside of PFAs. However, they also found that investments in wastewater infrastructure continued outside PFAs, and even included some using funds provided by the Maryland Department of the Environment.

Sohn and Knaap (2005) examined the effects of PFAs on job growth in Maryland. Although job creation tax credits are available throughout the state, more credits have been available inside PFAs than outside of PFAs since 1997, and eligibility for tax credits requires creating fewer jobs inside PFAs than outside of PFAs. Using three different econometric models, Sohn and Knaap found that more jobs were created inside PFAs than outside of PFAs after 1997, holding all other things constant. The differentials in job growth between areas inside and outside PFAs was small, however, and occurred only in a few selected industries. More recently, Hanlon, Howland, and McGuire (2009) examined the effects of PFAs on the probability of land development in Frederick County from 2000 to 2004. They concluded that parcels inside PFAs were more likely to be developed, all else equal.<sup>4</sup>

## Research on Similar Instruments

Although PFAs originated in Maryland, they share characteristics with three more widely used policy instruments. *Urban growth boundaries* (UGBs) separate areas where urban growth is allowed to occur from areas where it is not allowed. UGBs have been extensively analyzed, although most of this research focused on their effects on land and housing prices (Bae, 2006; Knaap, 2001; Nelson & Dawkins, 2004). While the debate is far from over, there seems to be some consensus that the effects of UGBs depend on how tightly they contain urban growth and how frequently they are expanded (Knaap, 2001; Pendall, Martin, & Fulton, 2002). Like UGBs, PFAs are intended to contain urban growth. However, development is not prohibited outside of PFAs. Instead, the PFAs are areas targeted for public investment.

PFAs most resemble *urban service areas* (USAs), which bound the expansion of public services like water and roads rather than limiting development of housing units. While there have been few empirical studies of USAs, Gleeson (1979) found that a USA in Brooklyn Park, MN, created differential land values inside and outside the boundary.

As targeted investment areas, PFAs resemble *enterprise zones* (EZs), areas where taxes are lower and regulations are

relaxed to encourage economic development (Green, 1991). The purpose of EZs is less urban containment than economic development (Wilder & Rubin, 1996), but like PFAs, they use incentives to concentrate private capital investment. Analyses of EZs' effects are also mixed, but there is growing support for the conclusion that they can alter the location of economic development activity even if they cannot increase the total amount of such activity (Boarnet, 2001; Sohn & Knaap, 2005). Thus, PFAs combine some attributes of UGBs, USAs, and EZs, giving some reason to believe they could succeed at containing urban growth.

### Research on the Effects of Infrastructure Spending on Urban Growth and Development

The logic behind PFAs presumes that the state pays a significant portion of the cost of infrastructure and that investment in infrastructure, particularly in sewers and roads, shapes the rate and location of urban growth (see Appendix). Yet, the voluminous literature on the effect of infrastructure investment on urban development is less than definitive. Research strongly indicates that investments in sewer capacity shape urban growth, but also that these relationships are indirect and vary across space and over time (Hanley & Hopkins, 2007; Tabors, Shapiro, & Rogers, 1976).

Research on how transportation infrastructure affects urban form is even more voluminous and complex. Both economic theory and common sense strongly support the proposition that extending highways leads to urban decentralization and low-density development patterns. According to economic theory, land rent gradients, and thus urban structure, are largely determined by the tradeoff between accessibility and transportation costs. Based on this logic, highway investments lower transportation costs, flatten land rent gradients, and cause urban expansion. Common sense suggests that development will take place where roads provide access. Almost no one disputes these general propositions. The disagreements center on issues of causality, elasticity, and significance.

Guiliano (1989) argued that the effects of highway investments on land use have diminished, and that, "transport cost is a much less important factor than location theory predicts" (p. 151). This is supported by Sen, Sööt, & Thakuriah (1998), who found that the decentralization of the Chicago metropolitan area began long before the construction of the metropolitan highway system and would have occurred even without the highways. On the other hand, following a detailed review of the literature, Boarnet and Haughwout (2000) concluded that "the evidence suggests that highways influence land prices,

population, and employment changes near the [highway] project, and that land use . . . [changes occur as a result] of losses elsewhere" (p. 9). Studying the effect of highways on suburbanization between 1950 and 1990 for all 2000 metropolitan statistical areas in the United States that had populations over 100,000 in 1990 and central city populations over 50,000 in 1950, Baum-Snow (2007) concluded that central city population in 1990 would have been 8% greater had the interstate highway system not been built. Additional research also supports that highways affect growth patterns (Duranton & Turner, 2007; Funderburg, Nixon, Boarnet, & Ferguson, 2008), and in a comprehensive review, Handy (2002) stated:

It is reasonable to conclude that new highway building will enable or encourage additional sprawl to some degree, although to exactly what degree is uncertain and depends on local conditions. However, the converse of this proposition is probably not true: not building more highways will probably not slow the rate of sprawl, at least not much. (p. 152)

In sum, it is not clear that limiting infrastructure expansion will contain urban growth. Further, while it is clear that state governments play a major role in infrastructure finance (U.S. Census Bureau, 2005), the effect of state infrastructure spending on urban growth remains highly uncertain. Persky, Kurban, and Lester (2000) found only very small impacts of state and federal spending on land absorption in the Chicago metropolitan area. Knaap and Talen (2003) found state spending on wastewater infrastructure also had only a minor impact on urban development patterns in Illinois. Thus, while the logic of limiting state spending on urban infrastructure to limit urban growth is sound (see Appendix), there is very little evidence from previous studies that this approach actually works.

In sum, the research to date suggests that policy instruments designed to concentrate growth in spatially designated areas can be influential. The extent of the influence, however, depends critically on the strength of the incentives or regulations and their institutional context. The limited research on the effects of PFAs is similarly mixed. There is some evidence that PFAs do serve to concentrate urban development, job growth, and investments in wastewater infrastructure. The extent of concentration, however, varies by county, by industry, and by the extent to which local governments rely on state funds.



## Defining PFAs

PFAs are the centerpiece of the Maryland program and the most innovative of the Maryland smart growth tools.<sup>5</sup> Unlike UGBs in Oregon, which impose direct restrictions on urban development, the 1997 Smart Growth Areas Act merely restricts state spending on statutorily defined growth-related programs to areas designated for urban growth. According to the Maryland Department of Planning (MDP, 2009a):<sup>6</sup>

The 1997 Priority Funding Areas Act [*sic*] capitalizes on the influence of state expenditures on economic growth and development. This legislation directs state spending to Priority Funding Areas. Priority Funding Areas are existing communities and places where local governments want state investment to support future growth.

## Geographic Scope

By statute, PFAs automatically include Baltimore City, incorporated municipalities, areas within the Baltimore and Washington Beltways, areas designated by the Maryland Department of Housing and Community Development for revitalization, EZs, and heritage areas. In addition to areas designated as PFAs by statute, local governments can designate additional areas as PFAs if they meet certain criteria (PFA, 2009).

Counties may designate additional areas as PFAs based on land use, developed density, zoned density, and water and sewer service criteria. Specifically, counties may include:

- areas inside locally designated growth areas zoned for industrial use by January 1, 1997, or served by public sewer;
- employment areas inside locally designated growth areas served by or planned for water and sewer;
- communities existing prior to 1997 that are located within locally designated growth areas served by public/community sewer or water systems, and having allowed, average residential densities greater than or equal to 2 units per net acre;<sup>7</sup>
- areas outside the developed portion of existing communities if they have allowed, average, build-out densities greater than or equal to 3.5 units per net acre;
- areas beyond the periphery of existing development that are scheduled for public water and sewer service, and have permitted residential densities greater than or equal to 3.5 units per net acre; and

- rural villages included in the local comprehensive plan before July 1, 1998.<sup>8</sup>

Counties may designate areas other than existing communities as PFAs based on analyses of supply and demand; that is, counties must analyze land capacity and present and future demand, and PFAs must match the amount of land needed for a clearly defined planning horizon (MDP, 1997). While the statute did not specify a particular planning horizon, MDP used a 20-year horizon as a standard benchmark.

Criteria for delineating PFAs are based on both actual and permitted densities. The density criteria established in the 1997 bill were the subject of much debate and criticism (Cohen, 2002; Knaap & Frece, 2007). The original version of the bill established the threshold for permitted density at 5.0 units per net acre, but this was amended to 3.5 units per net acre with urging from the Maryland Association of Counties. The smart growth advocacy organization 1000 Friends of Maryland argued that the revised threshold was too low, given that actual densities are often lower than permitted densities (Cohen, 2002; Knaap & Frece, 2007). Although the legislation contains language stating that land can be designated for inclusion in PFAs if “the designation represents a long-term development policy for promoting the orderly expansion of urban growth and an efficient use of land and public services” (PFA, 2009), the primary criteria for designating PFAs are existing or zoned densities and infrastructure capacity, rather than orderly plans for future urban growth. Figure 1 shows the locations of Maryland counties and their PFAs.

## Growth-Related Expenditures

As mentioned previously, the Smart Growth Areas Act aimed to affect development patterns by concentrating state spending on growth-related projects within PFAs. This growth-related spending consists of specific programs of the Maryland Department of Environment, the Maryland Department of Housing and Community Development, the Maryland Department of Business and Economic Development, and the Maryland Department of Transportation (MDOT) and is listed in Table 1. By statute, a growth-related expenditure is “any form of assurance, guarantee, grant payment, credit, tax credit, or other assistance, including a loan, loan guarantee, or reduction in the principal obligation of, or rate of interest payable on, a loan or a portion of a loan” (PFA, 2009).

## Reporting Requirements

According to the Smart Growth Areas Act, agencies are required to report annually to MDP regarding imple-

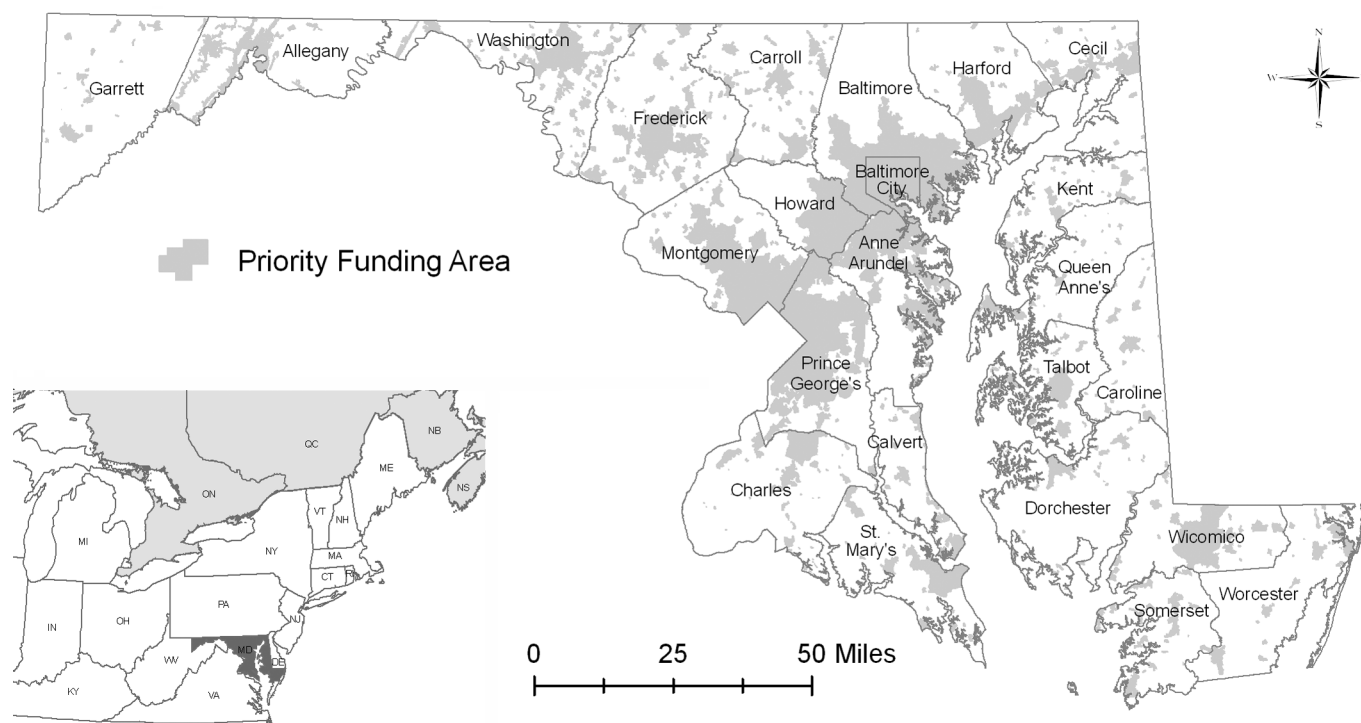


Figure 1. Maryland counties and their PFAs.

Source: MDP, 2002.

mentation of the act (PFA, 2009). An executive order by former Governor Parris N. Glendening (Smart Growth and Neighborhood Conservation Policy, 1998) bolstered this reporting requirement by outlining specifically what annual reports were to contain.<sup>9</sup> In 2001, when the Office of Smart Growth and the Smart Growth Subcabinet were established, responsibility for receiving reports from state agencies and issuing an annual report was assigned to the Smart Growth Subcabinet.

## Managing Growth With PFAs

To analyze the process of managing growth with PFAs, we employed several strategies. First, we examined the spatial configuration of each PFA using GIS data provided by MDP for each county and reviewed the files on PFA adoption maintained in the Baltimore office of MDP. Second, we conducted a content analysis of the comprehensive plan of each Maryland county, focusing on whether and how they addressed PFAs.<sup>10</sup> Third, we carefully examined the rules that restrict state spending to PFAs and analyzed budgets of pertinent state agencies over the last 10 years.

We studied capital and transportation<sup>11</sup> budgets to obtain information about how much money was subject to and spent in congruence with the law. To supplement this analysis, we conducted unstructured interviews with relevant state and local planners about certain aspects of the process to obtain their views on the implementation and efficacy of PFAs.

## The Creation and Configuration of PFAs

According to the 1997 legislation, local governments were required to submit PFA boundaries to MDP by October 1, 1998. Some counties' PFAs were uncomplicated and raised few issues; some counties submitted their PFAs in a piecemeal fashion; and some submitted PFAs only following extensive dialogue with MDP. Although the process varied for each of Maryland's 23 counties, the certification process generally went one of three ways: Some counties based PFAs on existing growth areas, which yielded a relatively contiguous pattern; some counties submitted all qualifying areas, resulting in a pattern in which the configuration of PFAs was not contiguous; and some counties drew PFAs much larger than necessary to accommodate growth projections, according to MDP comments.

Table 1. "Growth related" projects and exceptions by agency.

Agency	Description of agency	Projects subject to the PFA law	Specifically exempt from the PFA law	Board of Public Works exceptions	Exceptions permitted without review by the Board of Public Works
MD Dept. of Transportation	Includes five modal agencies: State Highway Administration, Maryland Transit Authority, Maryland Transportation Authority, Maryland Port Authority, and Maryland Aviation Authority.	All major projects in the construction program.	Projects administered by the Maryland Transportation Authority, which administers all toll facilities. PFA status need not be a consideration for system preservation, minor projects, and projects in the development and evaluation phase.	Exceptions can be granted by the Board of Public Works when a project connects PFAs, maintains the current transportation system without increasing capacity, has the purpose of giving the MD Dept. of Transportation control or access along an existing corridor, or operational characteristics require that the project be located outside of a PFA. No exceptions without review.	
MD Dept. of Housing and Community Development	Administers a wide range of programs generally focused on the health and vitality of communities and neighborhoods	Programs and projects related to the construction, purchase, and loans for new single-family homes, new multi-family homes, and the funding of neighborhood revitalization projects.	Funding for any project financed with federal moneys used to purchase or rehabilitate existing single- or multi-family housing or project financed with the proceeds of revenue bonds issued by the U.S. Community Development Administration.	In all cases, the Board of Public Works can grant exceptions for "extraordinary circumstances" defined as extreme inequity, hardship or disadvantages outweighing the benefits from locating a project in a PFA and for which there is no reasonable alternative for a project in a PFA in another location within the county or an adjacent county.	In all cases, exceptions are granted for health and safety, to permit adherence with federal laws, and for projects which demand location outside of PFAs because of operational or physical characteristics, including: natural resource based industries; agriculture, forestry and mining; industries proximate to airports, ports, railroads, transit, major highway interchanges, and tourism facilities.
MD Dept. of Business and Economic Development	Involved in attracting new businesses to the state, creating jobs, and retaining existing businesses.	Grants and loans to industrial development, small businesses, and a revolving "sunny day" fund providing assistance for economic development projects.	No special exemptions.		
MD Dept. of Environment	Enforces drinking and wastewater regulations and administers several grant and loan programs that fund water and wastewater infrastructure.	Water quality and water supply revolving funds, in addition to a supplemental assistance grant program for failing sewage and wastewater infrastructure.	Funding for sewer systems in existing communities beyond the periphery of the developed portion of the community if the expansion has a permitted average density of at least 3.5 units per acre.		
MD Dept. of General Services	Responsible for construction management, facilities maintenance, property acquisition, and real estate services for state government.	Land acquisition, real estate, and public improvements.	Projects related to maintenance, repair, additions, or renovations to existing facilities, acquiring land for telecommunications towers, parks, conservation and open space, and agricultural, conservation, and historic easements.		

Source: PFA (2009).

Some counties with strong growth management programs, particularly those in the highly developed central corridor from Baltimore to Washington, DC, simply submitted PFAs based on existing growth areas and implicit urban growth boundaries. For example, one of the counties shown in Figure 2 is Howard County, which submitted a single PFA based on existing growth areas that MDP certified without comment in 1997. The PFAs for these counties were sometimes drawn to accommodate less growth than forecasted for a 20-year period, but MDP accepted the proposed designations.<sup>12</sup> The resulting configuration is logical and relatively contiguous, reflecting long-standing plans (Knaap & Frece, 2007).

Some more rural or exurban counties in western Maryland included within the locally designated PFAs almost all areas meeting the statutory criteria, including qualified industrial or employment parcels, rural villages, and all areas with existing or planned sewer. Small rural villages are more prevalent in the western portion of the state than elsewhere. The resulting pattern of PFAs is not contiguous, with small PFA islands dotting the landscape. The prevalence of rural villages in Frederick County is evident in Figure 2.

Some counties on the Eastern Shore submitted large PFAs around cities anticipating extensive growth. MDP determined that many of these PFAs accommodated over 20 years of growth and requested that the counties resubmit smaller PFAs. Because the counties did not comply, MDP called portions of the PFAs *comment areas*, which meant they would not receive funding from state agencies for growth-related projects, at least throughout the Glendening administration (Knaap & Frece, 2007). Examples of such areas are shown in Wicomico County in Figure 2, labeled as "County Certified Areas; Areas Not Meeting Criteria." PFAs in these counties are in contiguous clusters, but the size of some of these areas exceeds the amount of land area that the counties determined, and MDP confirmed, is needed for 20 years of growth.<sup>13</sup>

With minor exceptions, the delineation of PFAs was completed relatively quickly and without extensive political conflict. However, it was also completed without much public participation. Some counties held local hearings, but only three interest groups with statewide membership (the Sierra Club, the Chesapeake Bay Foundation, and 1000 Friends of Maryland) participated in the certification process.

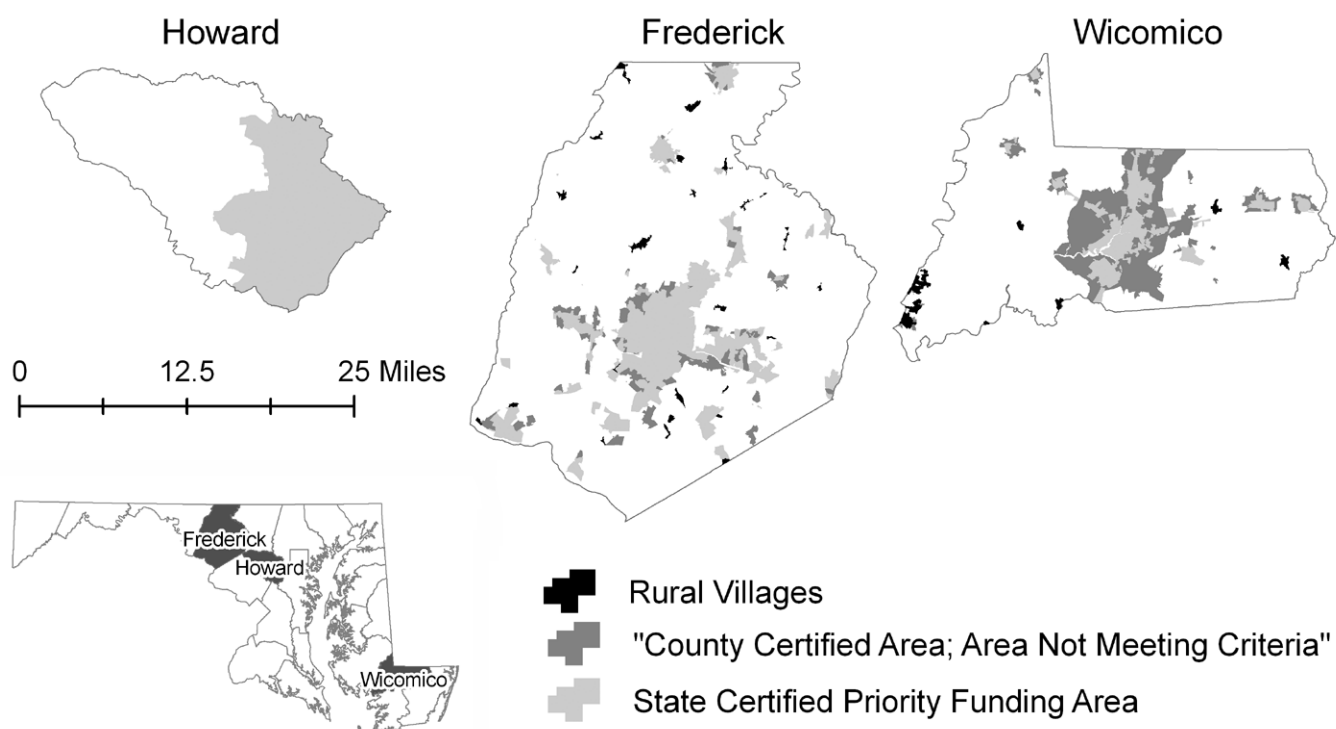


Figure 2: PFAs in select counties.

Note: Rural Villages are also state certified areas.

Source: MDP, 2002.



Although developers and local civic organizations were extensively involved in crafting the legislation, they were distinctly less involved in the process of designating PFAs.<sup>14</sup> Given the notably contentious legislative process it took to pass the Smart Growth Areas Act, the lack of participation by developers and other housing interest groups is surprising.

Since first drawn, PFAs have changed little over time. According to MDP data (2002, 2007), total area within PFAs grew approximately 2% from 2000 to 2005. The only major expansions occurred in St. Mary's, Somerset, Anne Arundel, Queen Anne's, and Dorchester Counties, and most involved municipal annexations. The single largest addition to PFAs was the Naval Air Station in St. Mary's County, which was added in 2004.

### PFAs and Comprehensive Plans

Because the PFA law is directed at spending by state agencies, all of the provisions that govern PFAs are found in the State Finance and Procurement Article of the Maryland Code: State Planning—Priority Funding Areas (5-7B). The statutes that govern planning and zoning are found in Article 66B: Land Use. Thus, there is no explicit requirement that PFAs appear in comprehensive plans. This separation of the state and local planning statutes epitomizes the lack of connection between state and local planning. Thus, the extent to which PFAs influence planning and zoning at the local level depends entirely on local discretion.

According to Article 66B, counties and municipalities must update their comprehensive plans every six years and submit the plans to MDP for review. Although the comprehensive plans of most jurisdictions have been updated since 1998, by the fall of 2007 at least five counties had not updated their comprehensive plans since the adoption of the PFA statute despite the legal requirement to do so (MDP, 2009b). Some counties update comprehensive plans by geographic sector and have not updated their countywide plans in over 10 years.

To determine how local governments have incorporated PFAs in their comprehensive plans, we conducted a content analysis of each of Maryland's 23 counties' comprehensive plans and the plans of the 10 largest municipalities in the state. Most county comprehensive plans reference PFAs somewhere, although eight counties who have PFAs and have updated their plans since 1998 do not show the PFA boundaries on plan designation or zoning maps. At least three counties fail to mention PFAs in their comprehensive plans at all. It is clear that PFAs are not consistently incorporated in local land use plans, and as a result are not an integral part of the statutory framework that governs land use planning, zoning, subdivision regulations, and appeals processes in the state.

## PFAs and State Agency Spending

To evaluate the implementation of PFAs at the state level, we first looked at the extent to which state agencies complied with the reporting requirements specified by statute and executive order. Then, we estimated how much funding is defined as growth-related, and thus by law required to be spent within PFAs. Then we looked at how much of this funding was in fact spent within PFAs as prescribed by the law for MDOT, which is the only agency for which project-level spending data were available.

### Compliance With Reporting Requirements

As discussed above, state agencies were required by law to submit annual reports to MDP on the implementation of PFAs. Compliance with reporting requirements under the act and subsequent executive order varied extensively over time, but was consistently incomplete. During the Glendening Administration (1995–2003) several agencies attempted to provide the required information to MDP, and MDP attempted to compile the information in a comprehensive report. Agency reports were filed with MDP in 1999 and 2000. The most complete report was prepared for fiscal year 2002 by the Office of Smart Growth on behalf of the Smart Growth Subcabinet. Even this report, however, did not contain a full accounting of how much spending was growth-related and how much was actually spent inside PFAs. During the Ehrlich Administration (2003–2006), the Office of Smart Growth annual reports contained no data on agency funding and little data on exceptions. Because reporting requirements were never fully met, it is difficult to assess whether or how much state agencies restricted their spending in conformance with the Smart Growth Areas Act or the extent to which state agency spending serves to contain urban growth.

### State Spending Under the Smart Growth Act<sup>15</sup>

Lacking the mandated reports by state agencies and the Smart Growth Subcabinet, we estimate total growth-related appropriations in the capital and transportation budgets each year and thus gain some insights regarding how much spending by state agencies is growth-related as defined by statute. Data was used from the Maryland Department of Budget and Management *Capital improvements authorized by the General Assembly 1998 through 2007* (2007), MDOT *Consolidated Transportation Program* (1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006), and the *Budget of State Government Appropriations Summary* (Maryland State Archives (1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006).

The state money earmarked for spending on projects within PFAs is a relatively small portion of overall state budget appropriations, and consists mostly of spending on transportation projects. The appropriated funds state agencies spent on growth-related capital and transportation projects from 1998 (FY 1999) to 2006 (FY 2007) averaged approximately \$1.1 billion per year, or approximately 5% of annual state budgets over the same period. Spending by MDOT constituted approximately 85% of all growth-related capital and transportation appropriations, and has been rising over time, while the spending of all other agencies has remained relatively constant (see Figures 3 and 4).

Of the total growth-related spending by MDOT, approximately 60% was for specific projects inside PFAs over the nine-year period. The remaining appropriations were for projects grandfathered when the legislation went into effect in 1998, projects in the transportation budget that had no single specific location, or projects that were granted exceptions. Less than 3% of this funding was for projects outside PFAs or excepted projects.

Spending by the Maryland Transportation Authority, which oversees the state's toll facilities, has increased over time relative to other entities within MDOT, but is specifically exempt from PFA review. Spending by the Mary-

land Transportation Authority was equal to 6% of all growth-related MDOT spending in 1998 and 50% of all growth-related MDOT spending in 2007. This represents a potentially large omission from the Smart Growth Areas Act, particularly considering recent trends toward tolling.

Since 1998, at least 62 projects were granted exceptions to PFA restrictions by the Smart Growth Coordinating Committee. Funding data were not available for some exceptions, making it difficult to evaluate the significance of these projects. At least four projects were granted exceptions by the Board of Public Works at the last stage of the exception process. Three of these were MDOT projects during the Ehrlich Administration. The fourth excepted project was also from MDOT (the Manchester Bypass), but did not receive funding in Governor Glendening's budget.

In sum, Maryland's process for using PFAs to manage urban growth has significant weaknesses. The criteria used to establish PFAs produced boundary configurations that vary widely across the state and are in many cases not ideally suited to managing urban growth. Ten years after their official designation, PFAs are not well integrated in land use decision making processes in many jurisdictions. Finally, state agencies have not established budgetary

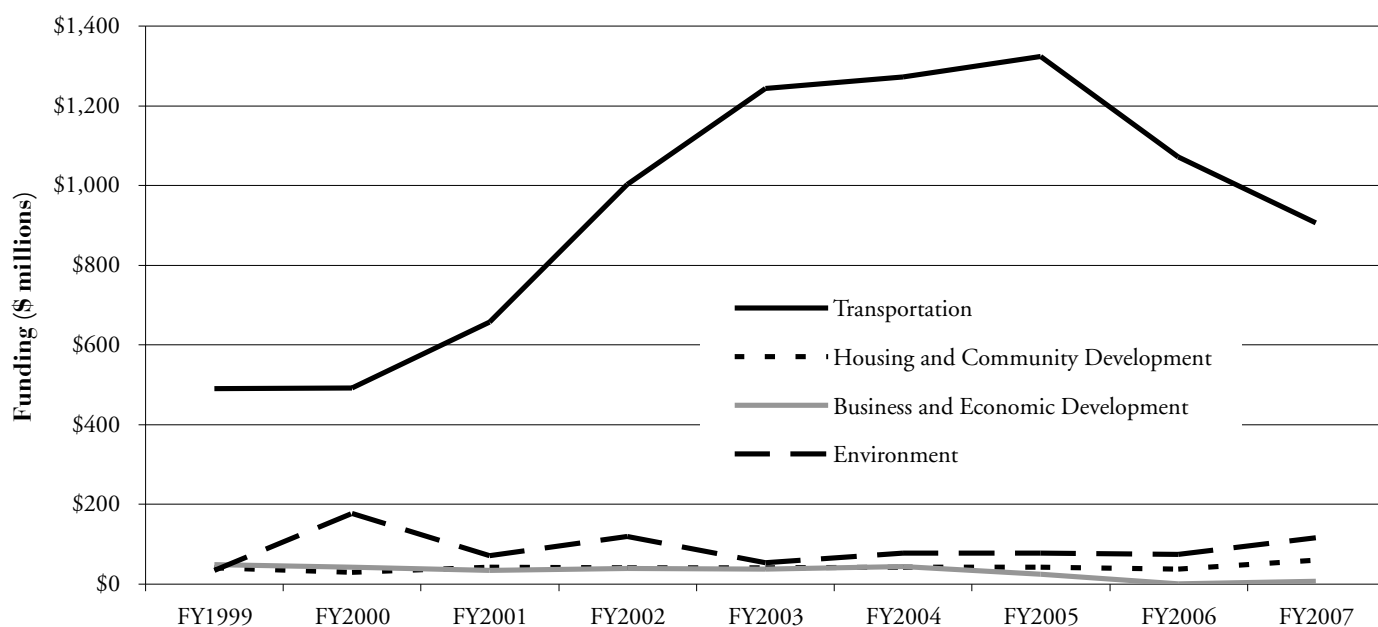


Figure 3. Total growth-related capital and transportation appropriations by Maryland state agency, FY1999–2007.

Note:

All Department of General Services appropriations are part of the operating budget, and thus are omitted here. Housing and Community Development appropriations here do not reflect tax-exempt mortgage revenue bonds in the Maryland Mortgage Program, which totaled \$1.4 billion, 2003–2007.

Sources: MDOT, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007; Maryland Department of Budget and Management, 2007.

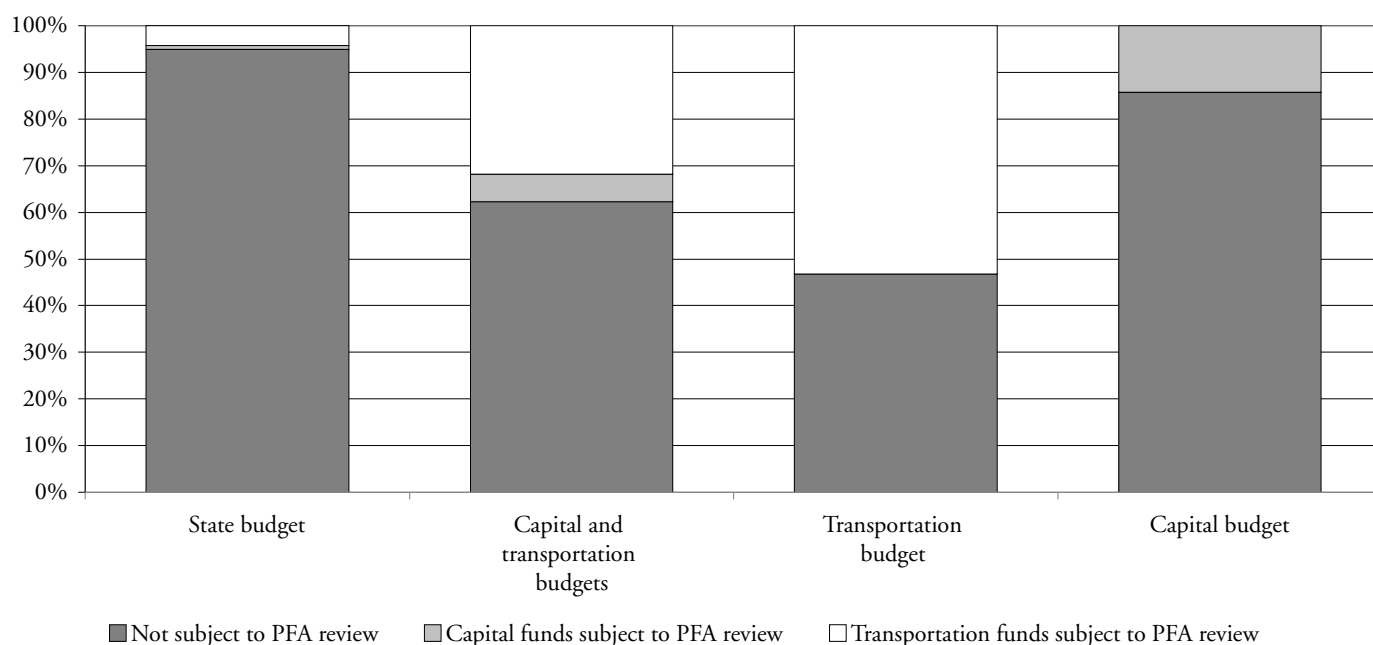


Figure 4. Average percent of growth-related funds, FY 1999–2007.

Note:

All Department of General Services appropriations are part of the operating budget, and thus are omitted here.

Sources: MDOT, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007; Maryland Department of Budget and Management, 2007; Maryland State Archives, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006.

systems designed to monitor and guide the spatial allocation of funds. Thus, if PFAs have not served to manage urban growth effectively, there are several potential explanations for why that might be the case.

## The Effects of PFAs on Residential Development Patterns

Above, we analyzed the implementation of PFAs and found it imperfect. But that is not surprising. The implementation of land use programs of any significance can always be improved. The ultimate question, however, is whether a program achieves its intended influence on development patterns. Maryland's 1997 smart growth initiative may have had other objectives, but it is clear that one of its principal objectives was to direct growth from outside PFAs to inside PFAs. According to Knaap and Frece (2007):

Although there were five pieces of legislation in that initial package, the thrust of Maryland's new growth

management effort was really embodied in only two—the Smart Growth Areas Act and the Rural Legacy Program. Together, they represented Governor Glendening's "inside/outside" strategy to encourage growth and revitalization *inside* existing cities and towns where development was already present; and, simultaneously, to identify and protect the best farmland, forests and other natural areas *outside* the urban envelope that should be protected from encroaching development. All the other programs that first year that were grouped under the state's smart growth banner, as well as those that were added in succeeding years, were harnessed in one way or another to support those two principal approaches. (p. 449)

There are several ways to measure whether the Maryland program has redirected growth from outside PFAs to inside PFAs. In our analysis, we measure development patterns using the number of parcels and acres developed inside and outside PFAs, the share of parcels and acres developed outside PFAs, and the average size of parcels inside and outside PFAs. Although they were not explicit policy objectives, it is reasonable to infer that increasing

urban densities (reducing urban lot sizes in the case of single-family residences), and increasing lot sizes outside urban areas to mitigate agricultural and habitat fragmentation, were among the reasons for diverting growth to inside PFAs.

We test for changes in these variables using *t* tests of differences in means before and after the adoption of the state smart growth program. In the literature on program evaluation differences in means, tests are sometimes viewed as weak indicators of program impact because they fail to control for the influence of countervailing factors (Felbinger & Langbein, 2006). For example, PFAs might have no apparent effect on development patterns because growth pressure increased after their adoption or because land available for development inside PFAs became depleted over time. Under these conditions, we might not observe PFAs' slowing of growth outside PFAs if it was offset by these other factors.

For a number of reasons, however, we argue that a difference in means or proportion of growth occurring inside or outside PFAs is an appropriate test of program success. First, by statute, PFAs were drawn to accommodate anticipated growth; thus, if growth overwhelmed development capacity it indicates that the PFAs were poorly drawn. Second, according to MDP estimates, every PFA in the state contained approximately 20 years of development capacity in 2006, more than enough to accommodate growth over the study period (Development Capacity Task Force, 2004). Third, the important policy question facing Maryland decision makers today is not whether to eliminate PFAs, but whether they are strong enough to achieve their intended purpose. Regardless of changes in external factors, a test for a difference in development patterns is thus the best test of programmatic success. Finally, the results are the same even when we control for changes in external factors (see Appendix). Because county-specific data are not available for all external factors, we present *t* tests below. These simple tests are clear and understandable at the county level.

Data produced by MDP provide an opportunity for closely examining development trends before and after the enactment of Maryland's smart growth laws. They include information on every parcel developed for attached or detached single-family housing from 1990 to 2006 and less than 20 acres in size after development. Using these data, we compare the period before PFAs (1990–1998) with that after PFAs (1999–2006).<sup>16</sup> While these data offer many useful insights, they offer little or no information on multifamily development, nonresidential development, or developments on parcels greater than 20 acres in size.<sup>17</sup> For these reasons, the data cannot be used to analyze trends in the commercial sectors of urban areas or most of

the agricultural sectors of rural areas. Still, the insights they provide are quite revealing.

Figures 5, 6, and 7 show trends in numbers of parcels developed for residential use, acres of land developed for residential use, and size of parcels developed for residential use. Figure 5 shows that the annual percentage of parcels developed outside PFAs rises from approximately 24% in 1990 to 26% in 2004. Figure 6 shows that the acres of land developed for residential use outside PFAs rose from approximately 75% in 1990 to 77% in 2004. Finally, as displayed in Figure 7, the average size of parcels outside PFAs fell from approximately 2.4 acres in 1990 to approximately 2.1 acres in 2004, and the average size of parcels inside PFAs rose from 0.25 acres in 1990 to 0.28 acres in 2004. If the intent of PFAs is to concentrate development and raise densities inside PFAs, and to prevent development on large parcels outside PFAs, then all of these trends are going in the wrong direction.

### Numbers of Parcels Developed

Table 2 shows the number of parcels developed for single-family residential use in each Maryland county and their four regions. This totaled about 23,000 per year both before and after PFAs for the state as a whole, however, the average increased in some counties and decreased in others. Total growth in residential parcels over the entire period increased most in the outlying counties of Dorchester, Talbot, and Washington.

At the state level, the number of such parcels developed inside PFAs fell by a statistically insignificant amount. However, the number of parcels developed per year inside PFAs fell by a statistically significant amount in Allegany, Anne Arundel, Baltimore, Calvert, Howard, and Prince George's Counties, and increased by a statistically significant amount in Cecil, Dorchester, St. Mary's, Talbot, and Worcester Counties. Similarly, the average number of parcels developed per year outside PFAs in the entire state rose by a statistically insignificant amount, but the average increase after 1998 was significant in Anne Arundel, Charles, Harford, and Montgomery Counties.

The share of parcels developed for residential use inside PFAs over the entire state fell from 76% to 71% after PFAs were adopted, although the share of parcels developed inside PFAs continued to vary widely, from only 14% in outlying Garrett County to 93% in central corridor Prince George's County. The share of parcels developed inside PFAs increased by a statistically significant amount in outlying Cecil, Talbot, and Worcester Counties, but decreased in many of the central and southern counties, including Anne Arundel, Baltimore, Calvert, Charles, Howard, Harford, and Montgomery. The share of parcels

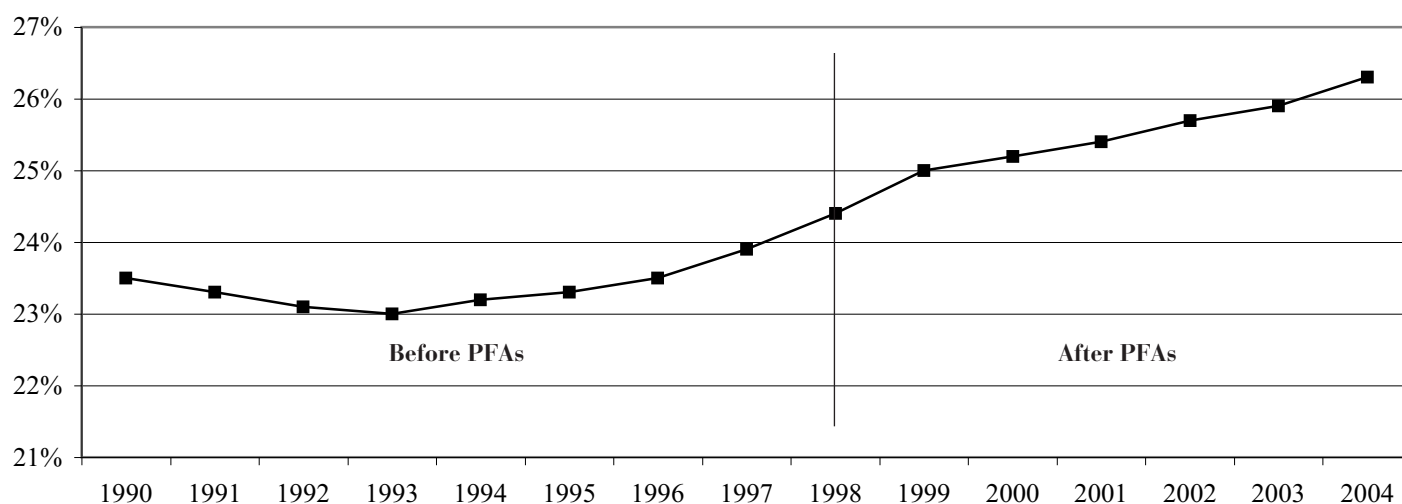


Figure 5. Improved single-family residential parcels<sup>a</sup> outside PFAs as a percentage of such parcels both inside and outside PFAs in Maryland, 1990–2004.

Note:

a. Defined as parcels of 20 acres or less with improvements worth \$1,000 or more.

Source: MDP, 2006.

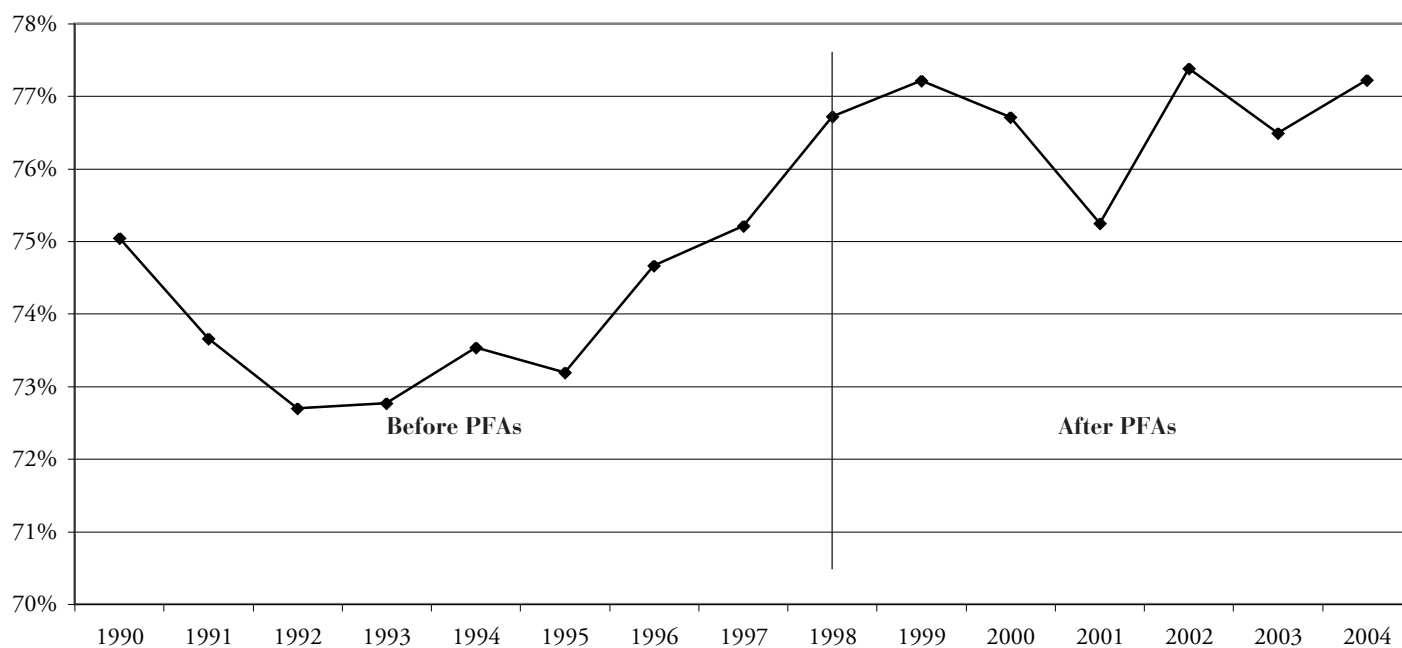


Figure 6. Acres of improved single-family residential land<sup>a</sup> outside PFAs as a percentage of such land both inside and outside PFAs in Maryland, 1990–2004.

Note:

a. Defined as parcels of 20 acres or less having improvements worth \$1,000 or more.

Source: MDP, 2006.



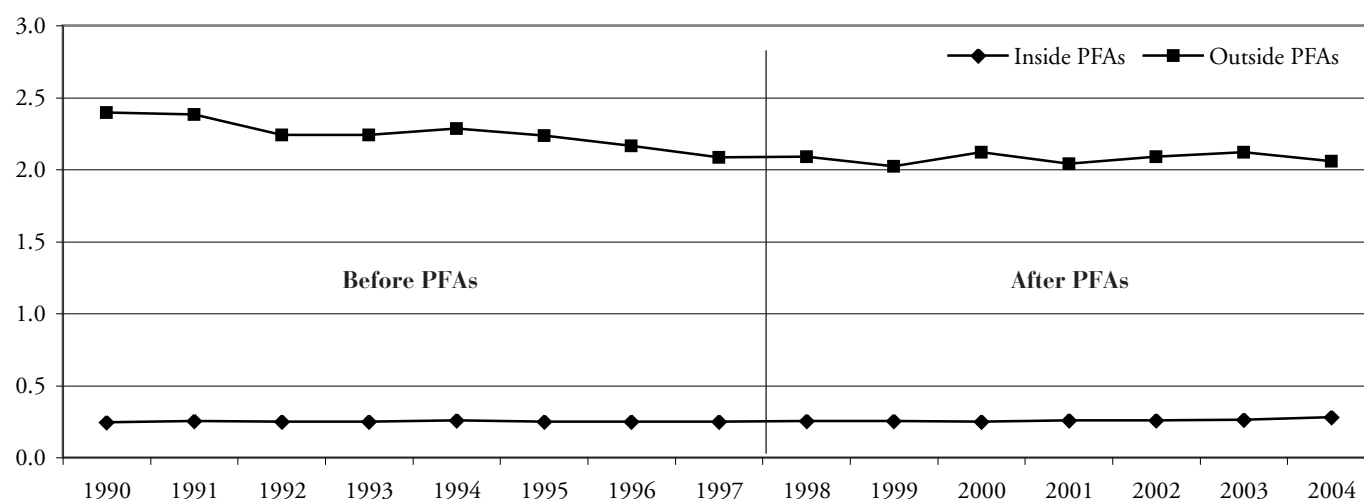


Figure 7. Average acres per parcel for improved single-family residential land<sup>a</sup> inside and outside PFAs in Maryland, 1990–2004.

Note:

a. Defined as parcels of 20 acres or less having improvements worth \$1,000 or more.

Source: MDP, 2006.

inside PFAs also decreased by a statistically significant amount in Allegany County in western Maryland.

In sum, there were no significant changes in the number of parcels developed for residential use inside or outside PFAs after the PFA law went into effect. There was also no significant change in the share of parcels developed for residential use inside PFAs. In many of the largest counties, however, the number of parcels and the share of parcels developed for residential use outside PFAs went up after the PFA law went into effect; and in many of these counties, the number of parcels developed for residential use outside PFAs continued to average 500 parcels per year or more after the PFA law.

### Acres Developed

Table 3 presents trends in acres of land developed for single-family use in each Maryland county. As shown, the total number of acres developed per year was about 16,945 before 1998 and 18,108 after 1998; however, the average number of acres developed increased in some counties but decreased in others.

At the state level, the average number of acres developed inside PFAs per year before 1998 fell by an insignificant amount in the period after 1998. However, the drop was statistically significant in Allegany, Anne Arundel, Baltimore, Calvert, and Howard Counties, and there was a statistically

significant increase in Cecil, Dorchester, St. Mary's, and Worcester Counties. Similarly, the average number of acres developed per year outside PFAs in the entire state rose from 12,569 over the period before 1998 to 13,889 over the period after 1998, a statistically significant amount. Meanwhile, the average number of acres developed after 1998 was significantly higher in Anne Arundel, Charles, and St. Mary's counties. Finally, the share of acres inside PFAs in the entire state fell by a statistically insignificant amount after 1998. However, the share fell by a statistically significant amount in Allegany, Anne Arundel, Calvert, and Montgomery Counties and increased by a statistically significant amount in Cecil, Talbot, and Worcester Counties.

It is notable that the total acres developed for residential use outside PFAs increased for over half of the state's counties after the PFA law went into effect. Further, several central corridor counties, including some with nationally prominent growth management programs like Baltimore County and Montgomery County, continue to develop over 900 acres per year for residential uses outside PFAs.

### Parcel Size

Finally, Table 4 uses ratios to compare the size of single-family residential parcels developed before and after PFAs, showing that parcels developed before 1998 averaged

Table 2. Average annual parcels developed in new single-family units before and after PFAs.

County	Total			Inside PFA			Outside PFA			% Inside PFA		
	Pre-PFA	Post-PFA	Ratio post/pre <sup>a</sup>	Pre-PFA	Post-PFA	Ratio post/pre <sup>a</sup>	Pre-PFA	Post-PFA	Ratio post/pre <sup>a</sup>	Pre-PFA	Post-PFA	Ratio post/pre <sup>a</sup>
Allegany	134	96	0.71*	95	57	0.60*	40	38	0.96	70%	60%	0.85*
Frederick	1,573	1,767	1.12	1,295	1,471	1.14	277	296	1.07	82%	83%	1.01
Garrett	221	243	1.10	30	34	1.12	190	209	1.10	14%	14%	1.01
Washington	570	717	1.26	374	480	1.28	195	236	1.21	66%	67%	1.02
<b>Western Maryland<sup>b</sup></b>	<b>2,498</b>	<b>2,823</b>	<b>1.13</b>	<b>1,794</b>	<b>2,042</b>	<b>1.14</b>	<b>702</b>	<b>779</b>	<b>1.11</b>	<b>72%</b>	<b>72%</b>	<b>1.01</b>
Anne Arundel	2,781	2,412	0.87	2,187	1,662	0.76*	594	750	1.26*	79%	69%	0.88*
Baltimore	2,571	1,955	0.76*	2,170	1,539	0.71*	400	416	1.04	84%	79%	0.93*
Carroll	1,036	1,084	1.05	632	688	1.09	403	396	0.98	61%	63%	1.04
Harford	1,610	1,559	0.97	1,360	1,218	0.89	249	341	1.37*	85%	78%	0.92*
Howard	1,769	1,440	0.81*	1,478	1,084	0.73*	291	356	1.22	84%	75%	0.90*
Montgomery	2,422	2,708	1.12	2,027	2,161	1.07	395	547	1.39*	84%	80%	0.95*
Prince George's	3,209	2,900	0.90	2,971	2,487	0.84*	238	413	1.73	93%	86%	0.93
<b>Central Maryland<sup>b</sup></b>	<b>15,398</b>	<b>14,058</b>	<b>0.91</b>	<b>12,825</b>	<b>10,839</b>	<b>0.85</b>	<b>2,570</b>	<b>3,219</b>	<b>1.25</b>	<b>83%</b>	<b>77%</b>	<b>0.93</b>
Calvert	830	802	0.97	434	321	0.74*	396	481	1.21	52%	40%	0.77*
Charles	977	1,199	1.23*	654	691	1.06	323	509	1.58*	67%	58%	0.86*
St. Mary's	645	757	1.17	252	310	1.23*	393	447	1.14	39%	41%	1.05
<b>Southern Maryland<sup>b</sup></b>	<b>2,452</b>	<b>2,758</b>	<b>1.12</b>	<b>1,340</b>	<b>1,322</b>	<b>0.99</b>	<b>1,112</b>	<b>1,437</b>	<b>1.29</b>	<b>55%</b>	<b>48%</b>	<b>0.88</b>
Caroline	157	167	1.06	38	55	1.43	119	113	0.95	24%	33%	1.34
Cecil	599	746	1.25*	221	335	1.52*	378	411	1.09	37%	45%	1.22*
Dorchester	120	162	1.35	26	57	2.21	94	105	1.11	22%	35%	1.63
Kent	98	117	1.20	47	58	1.25	51	59	1.16	48%	50%	1.04
Queen Anne's	334	380	1.14	163	211	1.29	171	168	0.98	49%	56%	1.14
Somerset	92	97	1.05	41	59	1.43	51	38	0.74*	45%	61%	1.36
Talbot	236	350	1.48*	144	256	1.77*	92	94	1.02	61%	73%	1.20*
Wicomico	437	510	1.17	312	370	1.19	125	140	1.12	71%	73%	1.02
Worcester	581	634	1.09*	414	490	1.18*	167	144	0.86*	71%	77%	1.08*
<b>Eastern Shore<sup>b</sup></b>	<b>2,654</b>	<b>3,163</b>	<b>1.19</b>	<b>1,406</b>	<b>1,891</b>	<b>1.34</b>	<b>1,248</b>	<b>1,272</b>	<b>1.02</b>	<b>53%</b>	<b>60%</b>	<b>1.13</b>
<b>State total<sup>b</sup></b>	<b>23,094</b>	<b>23,013</b>	<b>1.00</b>	<b>17,462</b>	<b>16,308</b>	<b>0.93</b>	<b>5,632</b>	<b>6,705</b>	<b>1.19</b>	<b>76%</b>	<b>71%</b>	<b>0.94</b>

Note:

a. An asterisk indicates that the number or percentage of parcels recorded before the Smart Growth Areas Act was significantly different from the same measure after the Smart Growth Areas Act, based on a difference-in-means t test.

b. Values in bold are totals or subtotals.

\* $p < .05$

about 0.73 acres, and those developed after 1998 averaged about 0.79 acres, though this varied across counties. Average parcel size inside PFAs rose from the first to the second period, but the change was statistically insignificant. Parcel size inside PFAs fell by a statistically significant amount in outlying Talbot and Wicomico Counties, but increased by

a statistically significant amount in central corridor Harford and Prince George's counties. The average size of parcels developed for residential use outside PFAs in the entire state fell from 2.23 acres over the period before 1998 to 2.07 acres over the period after 1998. This decrease was statistically significant. The average parcel size developed

Table 3. Average annual number of acres developed for single-family units before and after PFAs.

County or region	Total			Inside PFA			Outside PFA			% Inside PFA		
	Pre-PFA	Post-PFA	Ratio post/pre <sup>a</sup>	Pre-PFA	Post-PFA	Ratio post/pre <sup>a</sup>	Pre-PFA	Post-PFA	Ratio post/pre <sup>a</sup>	Pre-PFA	Post-PFA	Ratio post/pre <sup>a</sup>
Allegany	254	217	0.85*	81	51	0.63*	173	166	0.96	32%	24%	0.74*
Frederick	1,073	1,139	1.06	325	335	1.03	748	805	1.08	30%	29%	0.97
Garrett	507	546	1.08	19	21	1.09	488	525	1.08	4%	4%	1.01
Washington	700	811	1.16	161	198	1.23	539	613	1.14	23%	24%	1.06
<b>Western Maryland<sup>b</sup></b>	<b>2,534</b>	<b>2,713</b>	<b>1.07</b>	<b>586</b>	<b>605</b>	<b>1.03</b>	<b>1,948</b>	<b>2,109</b>	<b>1.08</b>	<b>23%</b>	<b>22%</b>	<b>0.96</b>
Anne Arundel	1,072	1,189	1.11	372	289	0.78*	700	900	1.29*	35%	24%	0.70*
Baltimore	1,387	1,250	0.90	374	314	0.84*	1,013	935	0.92	27%	25%	0.93
Carroll	1,250	1,259	1.01	257	244	0.95	993	1,015	1.02	21%	19%	0.95
Harford	1,076	1,205	1.12*	274	274	1.00	802	930	1.16	25%	23%	0.89
Howard	1,150	958	0.83	357	278	0.78*	794	680	0.86	31%	29%	0.94
Montgomery	1,118	1,285	1.15	383	370	0.97	735	915	1.24	34%	29%	0.84*
Prince George's	1,012	1,120	1.11	642	635	0.99	370	486	1.31	63%	57%	0.89
<b>Central Maryland<sup>b</sup></b>	<b>8,065</b>	<b>8,266</b>	<b>1.02</b>	<b>2,659</b>	<b>2,404</b>	<b>0.90</b>	<b>5,407</b>	<b>5,861</b>	<b>1.08</b>	<b>33%</b>	<b>29%</b>	<b>0.88</b>
Calvert	976	931	0.95	216	137	0.63*	759	794	1.05	22%	15%	0.66*
Charles	1,095	1,447	1.32*	141	161	1.14	954	1,286	1.35*	13%	11%	0.87
St. Mary's	1,044	1,322	1.27*	108	153	1.42*	936	1,169	1.25*	10%	12%	1.12
<b>Southern Maryland</b>	<b>3,115</b>	<b>3,700</b>	<b>1.19</b>	<b>465</b>	<b>451</b>	<b>0.97</b>	<b>2,649</b>	<b>3,249</b>	<b>1.23</b>	<b>15%</b>	<b>12%</b>	<b>0.82</b>
Caroline	357	351	0.99	18	16	0.89	339	336	0.99	5%	4%	0.91
Cecil	756	835	1.10	53	78	1.48*	704	757	1.08	7%	9%	1.34*
Dorchester	249	257	1.03	15	34	2.31*	234	223	0.95	6%	13%	2.24
Kent	132	168	1.27*	29	38	1.32	103	130	1.26	22%	23%	1.04
Queen Anne's	359	362	1.01	50	65	1.30	309	297	0.96	14%	18%	1.29
Somerset	167	170	1.02	46	61	1.34	122	109	0.89	27%	36%	1.32
Talbot	394	430	1.09	96	109	1.14	299	321	1.08	24%	25%	1.04*
Wicomico	487	474	0.97	237	220	0.93	250	253	1.01	49%	47%	0.96
Worcester	306	369	1.21*	99	123	1.24*	207	246	1.19	32%	33%	1.03*
<b>Eastern Shore<sup>b</sup></b>	<b>3,207</b>	<b>3,416</b>	<b>1.07</b>	<b>643</b>	<b>744</b>	<b>1.16</b>	<b>2,567</b>	<b>2,672</b>	<b>1.04</b>	<b>20%</b>	<b>22%</b>	<b>1.09</b>
<b>State total<sup>b</sup></b>	<b>16,945</b>	<b>18,108</b>	<b>1.07*</b>	<b>4,376</b>	<b>4,219</b>	<b>0.96</b>	<b>12,569</b>	<b>13,889</b>	<b>1.11</b>	<b>26%</b>	<b>23%</b>	<b>.90</b>

Note:

a. An asterisk indicates that the number or percentage of acres recorded before the Smart Growth Areas Act was significantly different from the same measure after the Smart Growth Areas Act, based on a difference-in-means t test.

b. Values in bold are totals or subtotals.

\* $p < .05$

after 1998 was significantly higher in Carroll, St. Mary's, and Worcester Counties but lower in Baltimore, Calvert, Charles, Harford, Howard, Montgomery, and Prince George's Counties.

Overall, the trends in parcels, acres, and size of parcels developed for residential use are not consistent with PFA

objectives. While development patterns may have changed in some areas and along dimensions not captured in the MDP data, in the period after the enactment of Maryland smart growth laws the number of parcels developed for residential use inside PFAs fell and parcels increased in size while the number of parcels developed outside PFAs increased

Table 4. Average annual parcel size<sup>a</sup> for single-family units before and after PFAs.

County	Total			Inside PFA			Outside PFA		
	Pre-PFA	Post-PFA	Ratio post/pre <sup>b</sup>	Pre-PFA	Post-PFA	Ratio post/pre <sup>b</sup>	Pre-PFA	Post-PFA	Ratio post/pre <sup>b</sup>
Allegany	1.89	2.27	1.20	0.86	0.89	1.04	4.35	4.32	0.99
Frederick	0.68	0.64	0.95	0.25	0.23	0.91	2.70	2.72	1.01
Garrett	2.30	2.25	0.98	0.64	0.63	0.98	2.57	2.51	0.98
Washington	1.23	1.13	0.92	0.43	0.41	0.96	2.76	2.59	0.94
<b>Western Maryland<sup>c</sup></b>	<b>1.53</b>	<b>1.57</b>	<b>1.03</b>	<b>0.55</b>	<b>0.54</b>	<b>0.99</b>	<b>3.10</b>	<b>3.04</b>	<b>0.98</b>
Anne Arundel	0.39	0.49	1.28	0.17	0.17	1.02	1.18	1.20	1.02
Baltimore	0.54	0.64	1.18	0.17	0.20	1.18	2.53	2.25	0.89*
Carroll	1.21	1.16	0.96	0.41	0.36	0.87	2.46	2.57	1.04*
Harford	0.67	0.77	1.16	0.20	0.23	1.12*	3.21	2.73	0.85*
Howard	0.65	0.67	1.02	0.24	0.26	1.06	2.73	1.91	0.70*
Montgomery	0.46	0.47	1.03	0.19	0.17	0.91	1.86	1.67	0.90*
Prince George's	0.32	0.39	1.23	0.22	0.26	1.18*	1.55	1.18	0.76*
<b>Central Maryland<sup>c</sup></b>	<b>0.61</b>	<b>0.66</b>	<b>1.08</b>	<b>0.23</b>	<b>0.24</b>	<b>1.03</b>	<b>2.22</b>	<b>1.93</b>	<b>0.87</b>
Calvert	1.18	1.16	0.99	0.50	0.43	0.85	1.92	1.65	0.86*
Charles	1.12	1.21	1.08	0.22	0.23	1.08	2.95	2.53	0.86*
St. Mary's	1.62	1.75	1.08	0.43	0.49	1.15	2.38	2.62	1.10*
<b>Southern Maryland<sup>c</sup></b>	<b>1.31</b>	<b>1.37</b>	<b>1.05</b>	<b>0.38</b>	<b>0.38</b>	<b>1.00</b>	<b>2.42</b>	<b>2.27</b>	<b>0.94</b>
Caroline	2.27	2.10	0.93	0.46	0.29	0.63	2.85	2.98	1.04
Cecil	1.26	1.12	0.89	0.24	0.23	0.97	1.86	1.84	0.99
Dorchester	2.07	1.58	0.76	0.57	0.60	1.05	2.49	2.12	0.85
Kent	1.35	1.43	1.06	0.62	0.65	1.06	2.02	2.20	1.09
Queen Anne's	1.07	0.95	0.89	0.31	0.31	1.01	1.81	1.76	0.98
Somerset	1.81	1.76	0.97	1.11	1.04	0.94	2.38	2.86	1.20
Talbot	1.67	1.23	0.74	0.66	0.42	0.64*	3.25	3.43	1.05
Wicomico	1.11	0.93	0.83	0.76	0.60	0.79*	2.00	1.81	0.90
Worcester	0.53	0.58	1.10	0.24	0.25	1.05	1.24	1.71	1.37*
<b>Eastern Shore<sup>c</sup></b>	<b>1.46</b>	<b>1.30</b>	<b>0.89</b>	<b>0.55</b>	<b>0.49</b>	<b>0.88</b>	<b>2.21</b>	<b>2.30</b>	<b>1.04</b>
<b>State total<sup>c</sup></b>	<b>0.73</b>	<b>0.79</b>	<b>1.07</b>	<b>0.25</b>	<b>0.26</b>	<b>1.03</b>	<b>2.23</b>	<b>2.07</b>	<b>0.93</b>

Note:

a. Average parcel size calculated as acres (Table 3) divided by total parcels (Table 2).

b. An asterisk indicates that the number or percentage of acres recorded before the Smart Growth Areas Act was significantly different from the same measure after the Smart Growth Areas Act, based on a difference-in-means *t* test.

c. Values in bold are totals or subtotals.

\**p* < .05

and the parcels decreased in size. Statewide, and in most counties, these changes are quite small; but in general, trends in the number of parcels developed, the acres of land developed, and the average size of parcels are all moving in the wrong direction.

Interestingly, the development trends were most adverse for the central Maryland counties including Anne Arundel, Baltimore, Calvert, Harford, Howard, Montgomery, and Prince George's, and most favorable for the outlying counties of Cecil, Dorchester, St. Mary's, Talbot,

and Worcester, although outlying counties are some of the fastest growing. Whether these general differences in development trends across regions of the state are the result of state policy, however, is unclear. In the outlying counties, there is less opposition to growth, more room to grow in PFAs, and more frequent expansions of PFAs. These are the more likely causes of such differences. The statistically significant increase in parcels and acreage inside PFAs in Eastern Shore counties is not surprising given housing market trends in these areas after 1999, which resulted in construction of more dense development in PFAs. Additionally, as mentioned above, Eastern Shore counties often had large comment areas around PFAs. In our data and analyses here, we considered comment areas to be part of PFAs.

## Summary and Conclusions

Given the above trends in residential development patterns, it is easy to be critical of the PFA approach, but it is important to note the limitations of the evidence to date: Ten years is not a long time to wait before evaluating a policy, the data are incomplete, and it is difficult to ascertain what would have happened had the Maryland smart growth policies not been adopted. That said, it is clear that PFAs have not produced the intended effects over the last 10 years.

As discussed above, and further analyzed in the Appendix, the logic of restricting growth-related funds to designated growth areas is conceptually sound, but PFAs as they are used in Maryland have both conceptual and practical limitations. On a practical level, the implementation of PFAs has had a number of problems. Specifically, the definition of which programs are growth-related is vague and not carefully monitored as programs change and new programs are created; the process for reviewing programs for consistency with PFAs is poorly designed; and state agencies have been lax in meeting reporting requirements.

Despite these limitations, PFAs have had some important, if ephemeral, benefits. Specifically, PFAs have provided a framework for discussion between the state and local governments. After 10 years, PFAs have become well understood elements of the Maryland landscape; despite differences in approaches to PFAs across the state, there is no confusion about what PFAs are intended to achieve or where they are located. As a corollary, measures of how much growth is occurring inside and outside PFAs, as reported here, are useful benchmarks of whether growth patterns are changing. For these reasons it makes little sense to do away with PFAs entirely. Nonetheless, PFAs as

currently used in Maryland have the following limitations that will require more extensive change.

- The statutory criteria for drawing PFAs are based on existing densities, infrastructure capacities, and municipal boundaries, not on careful plans that consider where future growth should occur.
- The process through which the existing PFAs were constructed was completed extremely quickly and without public participation.
- MDP can do no more than comment on PFAs it deems too large.
- PFAs are not well integrated with local plans. PFAs are not required elements in local comprehensive plans, and in some existing comprehensive plans, PFAs are not even mentioned.
- The funds allocated for spending in PFAs may be too small to make a significant difference in development trends.
- There is no requirement that PFAs be reviewed periodically and updated as needed.

Recognizing these limitations should allow Maryland to further refine the PFA concept and its implementation. Statutory changes that require local governments to include PFAs in local comprehensive plans and review PFAs together with comprehensive plans on a regular basis are now being considered (Task Force on the Future for Growth and Development in Maryland, 2008). In addition, the Smart Growth Subcabinet is now working to improve reporting procedures by state agencies. Finally, there is ongoing discussion of how PFAs might be revised in the context of the state's impending State Development Plan.

For other states considering the PFA approach to growth management, however, the lessons are perhaps more fundamental. First, it is important that PFAs be fully embedded in state planning law. As the Maryland experience suggests, without statutory requirements, tools that matter to the state are not always those that matter to local governments. Second, a targeted state spending approach requires a careful reconsideration of the state's budgeting processes. Without developing an allocation process that considers how funds are allocated spatially, it is unlikely state agencies will take the steps needed to make the targeting strategy meaningful. Finally, it is unclear that a targeted state spending strategy alone will be sufficient to alter state growth patterns. There is widespread evidence that incentives can serve as effective policy instruments in certain policy contexts. Yet, it is unclear whether any state will ever have enough resources to significantly contain urban growth.



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## Notes

1. For reviews, see Cohen (2002) and Knaap and Frece (2007).
2. As of 2008, only Connecticut had adopted a PFA program similar to Maryland's (General Statutes of Connecticut, 2008). The Connecticut law passed in 2005, and the language of the statute is nearly identical to Maryland's, but the PFAs were not established and implemented until July of 2009.
3. For more on state land use programs, see Ingram, Carbonell, Hong, and Flint (2009); Porter (2008); and Weitz (1999).
4. For more evaluations of Maryland's smart growth initiative, see materials from the Smart Growth at 10 conference (National Center for Smart Growth Research and Education and Resources for the Future, 2007).
5. For a review of the additional smart growth tools in Maryland, see Knaap and Frece (2007) and Frece (2008).
6. The Maryland Office of Planning was renamed the Maryland Department of Planning in 2000. We use the latter name throughout.
7. Average density, both allowable and existing, is calculated excluding public land, recreational land, land in agricultural easements, cemeteries, streams and buffers, land in 100-year floodplains, habitats for endangered and threatened species, steep slopes, and nontidal wetlands.
8. A rural village is "any rural village, village center, or other unincorporated area that is primarily residential, including an area with historic qualities, that is located in an otherwise rural or agricultural area and for which new growth, if any, would derive primarily from in-fill development or limited peripheral expansion" (PFA, 2009).
9. Specifically, Executive Order 01.01.1998.04 states that, "Agencies will provide an annual report to the Office of Planning on the implementation of the Smart Growth Areas Act. The Annual Report should include the following: (a) A description of projects/programs and costs of activities in Priority Funding Areas; (b) A description of projects/programs and costs of activities funded under the exceptions allowed in §5-7B-06 of the State Finance and Procurement Article; (c) Projects submitted to the Board of Public Works for funding outside Priority Funding Areas under the extraordinary circumstances exception in accordance with §5-7B-05 of the State Finance and Procurement Article and the impact of these projects upon this policy; (d) A list of programs and policies reviewed and changed to ensure compliance with Policy."
10. Unlike other states, land use planning in Maryland is dominated by county governments.
11. The MDOT maintains a separate budget from the state's capital budget entitled the *Consolidated Transportation Program*, which includes both capital and operating expenses for the department.
12. We obtained this information from MDP PFA certification files.
13. We obtained this information from MDP PFA certification files.
14. We obtained this information from MDP PFA certification files and email (J. Noonan, personal communication, October, 2007).
15. For further details on state spending, see Knaap and Lewis (2007).
16. Because PFAs were required to be submitted to MDP by October 1998, we treat 1990–1998 as the period before PFAs and 1999–2006 as the period after PFAs.

17. MDP defined development as an increase in improved value exceeding \$1,000. These data do not capture developments on parcels greater than 20 acres unless and until improvements are made on parcels, which are subdivided to a size smaller than 20 acres.

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## Appendix: Theoretical Model and Regression Analysis of PFAs

The effects of a PFA boundary on urban development patterns can be illustrated with a simple model. Suppose, following standard economic theory, that land rents are a decreasing function of distance to the urban core. That is:

$$r = r(d)$$

where

$r$  = rents

$d$  = distance to the central business district (CBD), and

$\delta r / \delta d < 0$ .

Suppose further that the level of private investment in residential capital per acre (or structural density) is an increasing function of  $r$  and public infrastructure. That is:

$$k = k(r(d), I)$$

where

$k$  = private residential capital

$I$  = public infrastructure per acre, and

$\delta k / \delta r$  and  $\delta k / \delta I > 0$ .

Finally, suppose that the level of public infrastructure inside the PFA is greater than outside the PFA. That is:

$$I_i > I_o$$

where

$I_i$  = public infrastructure inside a PFA, and

$I_o$  = public infrastructure outside a PFA.

Under these conditions private residential capital will be greater inside PFAs than outside PFAs as long as  $I_i > I_o$  and  $\delta k / \delta I > 0$ .

This simple model is illustrated in Figure A1, where structural density falls continuously with distance from the CBD if there is no PFA. The introduction of a PFA causes a kink in the structural density gradients because there is a discontinuous gap in the level of public infrastructure.

To further explore the effect of PFAs on development patterns, we estimated four regression models using counties as units of analysis and controlled for potential counter-vailing factors. Our analysis includes four dependent variables: the number of parcels developed outside PFAs, the share of parcels developed outside PFAs, the number of acres developed outside PFAs, and the share of acres developed outside PFAs. The models all include five independent variables: real gas prices at the national level, real income in thousands of dollars at the county level, time measured in years, and the total number of parcels developed at the county level. Using panel data by county for each year from 1990 to 2006, we also controlled for county-specific fixed effects by including dummy variables for each of the 23 counties. We omitted Baltimore City from this analysis because 100% of the city is a PFA. Our variable of interest (*PFA in effect*) is a dummy variable equal to 1 for observations after 1999, when the Smart Growth Areas Act went into effect. If PFAs have had the intended results, residential development outside PFAs should have fallen after the law went into effect.

As shown in Table A1, the regression models produced plausible and robust results. The results suggest that the share and number of both acres and parcels developed outside PFAs increased consistently over time and with real county income levels. This might reflect the effects of dwindling development capacity inside PFAs and a positive income elasticity of demand for rural residency. The share and number of acres developed outside PFAs decreased

consistently with real gas prices, which probably reflects standard assumptions about tradeoffs between accessibility and housing demand. Finally, the number of acres and parcels developed outside PFAs increased with total parcels developed, but the share of areas and parcels developed outside PFAs fell with total parcels developed. This implies that in the years in which there was much development activity in a county, development outside PFAs went up, but because development inside PFAs went up faster than

development outside PFAs, the share of development outside PFAs declined.

These results are robust, consistent with expectations, and conform to results presented earlier in the article. The effect of the PFA variables is insignificant in every regression. Most importantly, they suggest that the Smart Growth Areas Act and the other set of policies adopted in 1997 have not significantly served to redirect growth inside PFAs, even after controlling for countervailing factors.

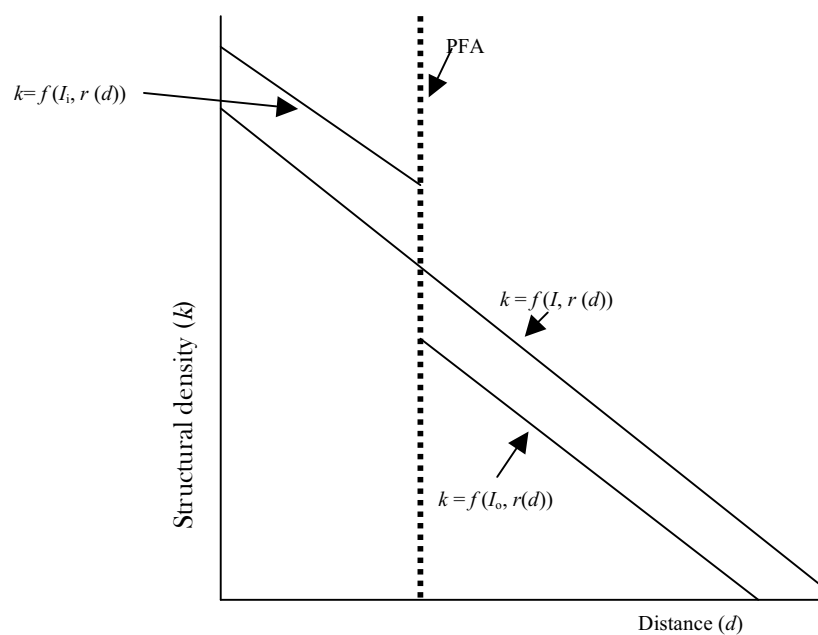


Figure A1. The effects of PFAs in an urban economic model.

Table A1. Models predicting the percentages and numbers of parcels and acres developed in single-family housing outside PFAs for a panel of 23 Maryland counties, 1990–2006.

	<b>Model 1: Predicting % of parcels outside PFA</b>		<b>Model 2: Predicting number of parcels outside PFA</b>		<b>Model 3: Predicting % of acres outside PFA</b>		<b>Model 4: Predicting number of acres outside PFA</b>	
	<b>Coeff.</b>	<b><i>t</i></b>	<b>Coeff.</b>	<b><i>t</i></b>	<b>Coeff.</b>	<b><i>t</i></b>	<b>Coeff.</b>	<b><i>t</i></b>
Constant	2.052	5.07***	1631.700	4.21***	1.550	5.27***	3450.742	5.72***
PFA in effect (0,1)	0.017	1.05	4.570	0.29	0.012	1.02	26.482	1.09
Year	0.044	3.30***	51.143	3.96***	0.022	2.27**	99.399	4.95***
County real income (\$1,000)	0.000	3.83***	0.004	5.13***	0.000	3.26***	0.005	3.45***
National real gas price	−1.586	−3.93***	−1568.613	−4.06***	−0.775	−2.64***	−3193.246	−5.31***
Number of developed parcels in the county (thousands)	−0.054	−3.38***	160.872	10.57***	−0.016	−1.41	290.012	12.26***
<i>n</i>		391		391		391		391
Adjusted <i>R</i> <sup>2</sup>		0.874		0.829		0.843		0.886

\*\**p* < .01    \*\*\**p* < .001