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Identifying Constraints to Rural Economic Development: A Development Guidance Function Approach

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We propose a method that incorporates specific business needs and community goals to identify community assets that most constrain local economic development. Access to a managerial workforce was the most common highly ranked constraint, but the set of most constraining assets varies across communities. Thus, a one-size-fits-all development policy is not appropriate. We also find that constraint rankings are highly correlated among communities that share tourism potential, that share energy resources, or that rely upon production agriculture. Development practitioners may craft a suite of development policies, each tailored to communities of a given typology.

Key words: development constraints, economic development, goal setting, guidance function


Introduction

The overarching objective of economic development is to create good jobs and facilitate community well-being (Bartik, 2017; Parilla and Liu, 2018; Rickman and Wang, 2020). A central aspect of all regional development strategies is creating a favorable business climate, which—as defined by the dominant neoclassical approach—is characterized by low wages, low tax rates, and light regulation. The vast majority of publicly sponsored development efforts thus tend to focus on a relatively narrow set of economic benefits to the community and to government entities: incomes, job creation, fiscal impacts, and potential multiplier effects. While these are important concerns, this narrow set of development measures does not capture the broader economic, social, and environmental effects of development on communities, which have been addressed in subsequent theories. The institutional model of development expands the focus to include the role of formal entities that affect development policies, such as federal, state, and local governments, labor unions, trade associations, and the financial sector. The behavioral approach to economic development emphasizes how quality-of-life factors (e.g., social and cultural opportunities, affordable housing, educational opportunities, public safety, and high-quality natural environment) influence development choices and subsequent outcomes.

Regardless of the underlying theory driving economic development plans, empirical analyses consistently find mixed evidence on the effectiveness of any given incentive or structural change designed to accelerate regional growth (Conroy, Deller, and Tsvetkova, 2016; Bartik, 2017). A policy found to improve measures of economic well-being in one region is often found not to have worked in another region. Given that a one-size-fits-all policy is unlikely to exist, especially if regions exhibit

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variation in the factors that restrict economic development, one should not be surprised by the mixed findings of the empirical literature. That is, if business taxes are high in one region and low in another, then business taxes are more likely to be a constraint in one community and not in the other. Despite a voluminous literature examining the effect of economic development policies on measures of economic growth, relatively little effort has focused on identifying local economic development constraints and comparing them across regions.

Further, none of the major approaches to economic development explicitly incorporate the development goals and preferences of community residents; instead, they assume that community preferences match those of community officials. Incorporating community considerations in the economic development planning process brings an additional degree of complexity to crafting effective local economic development policy. To do so, community development planners must not only appraise the business expansion and locational requirements of firms and gauge those requirements against the assets offered by a community, but they must also elicit the development preferences and goals of residents, who are the presumed beneficiaries of publicly sponsored development efforts.

Explicitly matching the needs of specific firms and industrial sectors to local community assets and regional residents' development desires is not a new idea. Minshall et al. (1971) identified manufacturing industries that were "feasible" to locate in the Four Corners Region of the Southwestern United States (e.g., by matching the skills of the local labor pool to the industries' needs) as well as ascertaining those industries that would be considered "desirable" (e.g., the industry's growth and employment potential match the growth desired by local leaders). The Community Business Matching model (Halbrendt, Zheng, and Lucas, 2000; Buescher et al., 2001; Cox et al., 2009) expanded the range of factors considered in the feasibility and desirability analysis and formalized calculation of the (renamed) *compatibility* and *desirability* metrics. Here, the desirability index was based on a set of preference weights elicited from the general public, not just community officials. In 2011, the Area Sector Analysis Process (ASAP) (Harris et al., 2012; Bordigioni et al., 2020) further refined how the compatibility and desirability indices are measured. Over the years, ASAP activities have resulted in relatively large databases of industry/firm business location requirements and community development preferences.

We use the ASAP databases to calculate firm-level compatibility and desirability indices and test an explanation for why some components of an economic development plan may be successful in some places but not others. Our hypothesis is that communities are varied in the assets that most constrain economic development and that the inability to precisely identify the key constraints hampers development policy outcomes. We measure and rank asset constraints by first constructing a development guidance function that incorporates the level of community assets needed by businesses looking to expand or relocate and the development outcomes desired by community residents. The function provides a summary measure of the attractiveness of a community to business startup, expansion, or relocation, but it is the first derivatives of the function that have an immensely practical application: The value of the derivative with respect to each community asset level can be used to rank the assets that most constrain a community from meeting its development goals.

In addition to ranking community asset constraints, our approach provides an additional benefit. Following ASAP applications in roughly 20 communities in Utah, Idaho, Arizona, New Mexico, and Nevada from 2011 to early 2019, interest in ASAP expanded rapidly as other regional economic development directors learned of the tool from their colleagues. Between 2019 and 2022, local development directors from another 21 western US communities requested an ASAP analysis. These requests provide *prima facie* evidence of ASAP's value to local economic development authorities but little in the way of an objective assessment. Our asset constraint rankings across numerous communities offer the opportunity to test the validity of ASAP analysis. We find that the assets identified as most constraining vary across communities in ways that make sense, providing evidence of the validity of the ASAP approach. We find that communities that share similar economic structures have assets constraints that are highly correlated.

Background

Site selection for a firm's start-up, relocation, or expansion is a complex decision influenced by a range of economic, regulatory, political, social, and environmental conditions (McLeman and Smit, 2006). From a policy perspective, competition among states and regions over favorable business environments began in 1933, when Mississippi successfully attracted northern manufacturers using policies that now define the neoclassical economic development approach: low taxes, cheap labor, and minimal regulation (Eisinger, 1988; Shaffer, Deller, and Marcouiller, 2004; Deller and Goetz, 2009). This economic development effort became a model for how policy makers think about attractive regional business climates (Conroy, Deller, and Tsvetkova, 2016).

Conroy, Deller, and Tsvetkova (2016, 2017) note several shortcomings of the neoclassical approach that limit its applicability to large firms with formal location/expansion procedures, such as an assumption of zero (or minimal) transaction costs and large informational requirements. Further, its narrow focus on costs has led to two other theoretical approaches to business expansion and location decisions. The institutional model focuses on business decisions by examining the relationships and relative negotiating power of firms, state and local governmental development agencies, and suppliers. Much like the neoclassical model, this approach is best applied to large firms able to negotiate tax concessions and other publicly provided incentives from a position of strength. In contrast, the behavioral economic development model examines business decisions from a perspective that is internal to the firm. This approach relaxes the information requirements of the previous models by noting that decisions are often made by a small number of people or even a single business owner. As such, expansion and location decisions reflect the idiosyncrasies of decision makers who may choose to sacrifice profit-maximization in favor of conducting business activities in a community in which they want to live. The behavioral approach is most applicable to smaller firms, for which business choices are highly centralized and not subject to more rigid decision processes characteristic of larger firms. Further, this approach places a greater emphasis on quality-of-life measures, such as good environmental quality and access to cultural and recreational resources, relative to taxes and incentives.

The neoclassical approach, with its focus on lowering a firm's production costs, and the institutional approach, with its focus on incentives provided to firms, remain influential in modern economic development policies despite a mixed record of empirical success in multiple regions over many decades. Bartik (2017) summarizes targeted business tax and incentive policies that characterize the neoclassical and institutional approaches. In addition to low-income taxes, business incentives may include property tax abatement (i.e., reducing property taxes below normal rates) and job creation tax credits (i.e., providing tax benefits for jobs created). We feature only a small selection of the literature evaluating the effectiveness of these approaches in spurring economic growth, but extensive review articles by Bartik (1991), Poot (2000), and Rickman and Wang (2020) provide excellent summaries for the interested reader.

Some researchers claim that lower taxes and increased incentives create jobs and stimulate economic growth (Goss and Phillips, 1994; Greenstone and Moretti, 2003; Greenstone, Hornbeck, and Moretti, 2010). The latter two studies present evidence affirming that targeted incentives attract large industrial plants, resulting in increases in local economic activity without crowding out existing business activity. More recently, Guo and Cheng (2018) find that a combination of lower business tax burdens and greater government spending on transportation, public safety, and economic and physical environment can spur entrepreneurship and business retention. Pan et al. (2020) find small positive effects of business incentives on firms' relocation decisions but caution that the effect is very small: Incentives and tax reductions must be "infeasibly large" before an "economically meaningful" increase in firms will be seen.

Others have argued that such interventions have no clear positive benefits for the broad economy (Hicks and Shughart, 2007; Rosen and Gayer, 2013; Byrne, 2018). For example, Fox and Murray (2004) find little or no significant long-run impact on economic growth following the recruitment of large

industries. Similarly, Bruce et al. (2009) find that regional tax and nontax incentives do not have any significant statistical relationship with growth in employment, income, or gross state product. Hansen and Kalambokidis (2010) provide evidence that tax-free zones had done little to promote economic growth, at least at the county level. Moreover, Saiz (2001) reports that incentives used for locational strategies have a negative relationship with employment in the finance, insurance, and real estate sectors. Bundrick and Snyder (2018) find that cash subsidies used to attract new firms or retain existing firms did not create any significant private employment or establishment benefits. In contrast, they find evidence of a statistically significant—but economically small—negative establishment spillover effect in neighboring counties. Partridge et al.'s (2020) study of business startups in metropolitan counties reports a similar negative crowding out effect, not just in industries that receive incentives but also spilling over into other industries.

Rickman and Wang (2020, p. 424) characterize the mixed conclusions of extant tax and incentive literature rather tepidly: “We know more now. But our knowledge is unlikely to ever be sufficient to provide universal policy guidance.” They advocate looking at taxes and incentives within the context of the “specific circumstances” under which such policies are to be implemented. Some of these contexts may be revealed by industry recruitment and relocation studies (e.g., McCann, Arita, and Gordon, 2002; Brouwer, Mariotti, and van Ommeren, 2004; Pellenbarg and Wever, 2008; Conroy, Deller, and Tsvetkova, 2016). These authors find that, in addition to tax savings and incentives, the main forces driving industry relocation are the need for a more suitable business environment and/or premises.

The quality-of-life (QOL) elements that feature in the behavioral theory of firm expansion and location also fit within the rubric of specific circumstances as identified by Rickman and Wang (2020). For example, Love and Crompton (1999) perform a factor analysis of business relocation decisions. In addition to the variables identified by the neoclassical and institutional approaches (i.e., labor and other input costs, government involvement and taxes, and proximity to suppliers and customers), this model suggests the importance of daily living concerns and measures of QOL. Daily living concerns included personal safety and crime rates. QOL included numerous items related to culture and outdoor recreation, local educational quality, and spousal employment opportunities, among others. The authors' survey of firms that had recently relocated to Colorado revealed that the most important factors in a relocation decision are those associated with neoclassical theory. This conclusion comes with two caveats. First, poor QOL metrics for a community caused it to be eliminated from consideration; in this sense, QOL is most important during the initial screening of potential sites.¹ Second, the QOL of a region was more important to firms that had relocated from outside the state than to businesses relocating within the state.

Though Rickman and Wang (2020) focus on elements associated with the tax and incentive policies of the neoclassical and institutional models, their conclusion—to evaluate policies within the specific circumstances within which the policy enacted—holds true for the behavioral approach as well. A key aspect missing from the literature is an evaluation of the set economic development assets and constraints that are unique to a given community. Perhaps a low-cost loan incentive worked well in one region because capital investment was the primary constraint there, and it did not work well in another region because access to capital was not a binding constraint. To develop an effective set of targeted tax and incentive benefits, one should first evaluate which is needed most or whether incentives are needed at all. Other constraints—say, improving access to an interstate highway, or providing a high-volume water supply—may increase the probability of firm success and accelerate economic growth relative to lower taxes and other incentives.

¹ Buttressing this finding, Hipp et al. (2019) report that higher crime rates were associated with increased probability of business failure and relocation for most industries (with the notable exception of the insurance industry).

Theoretical Model

As noted in the introduction, our theoretical approach is based upon community development approaches that have emphasized the need to match firms/industries to communities/regions (Minshall et al., 1971; Buescher et al., 2001; Cox et al., 2009; Harris et al., 2012; Bordigioni et al., 2020). The two key aspects in the matching process are (i) businesses finding the community an attractive place to locate based on the adequacy of resources offered by the community and (ii) communities finding firms and industries that satisfy community goals. Firms' startup, retention, expansion, or location decisions rest upon the assets that collectively constitute the business environment of the community within which the firm will operate. Further, public efforts designed to promote startup, retention, expansion, or recruitment of firms must also be acceptable to the community. Thus, these models distinguish between the *compatibility* of assets needed by a firm and the *desirability* of hosting that firm in the community. Notably, we define community assets as encompassing all of the important factors that distinguish the neoclassical, institutional, and behavioral approaches to economic development as described in our literature review. The modeling perspective for our guidance function is that of an economic development planner seeking to identify which assets defining the local business environment are most constraining for any potential firm f , while also weighting firms by the degree to which they are desired in the community.

We begin with the compatibility index, which assesses both the relative availability of an asset in a community, as well as the importance of that asset to the firm. Here, the community's level of assets \mathbf{A} , a vector composed of M elements a^i ($i = 1, 2, \dots, M$), is compared to the national or regional reference level of each asset i . We define the relative availability of an asset in the community as da^i :

$$(1) \quad da^i = \frac{a^i}{a_R^i} \text{ if } a^i < a_R^i, \text{ else } da^i = 1,$$

where a^i is the level of asset i in the community and a_R^i is the level of that asset in the reference community. If da^i takes a value of less than 1, the prevalence of asset i in the community is below that of the reference community. For example, if an asset, a^i , were the availability of a managerial workforce—defined as the proportion of the workforce with a college degree or higher—how does the community compare to the reference value for the asset?² A generalized form of the compatibility index for firm f can be based on relative “gaps” for M assets:

$$(2) \quad CI_f = CI(da^1, da^2, \dots, da^M; \omega_f) = CI(\mathbf{A}; \mathbf{A}_R, \omega_f),$$

where \mathbf{A}_R is a vector of reference asset levels and ω_f is a conformable vector of M weights characterizing the importance of assets to firm f . Small gaps (or even large gaps) for assets that are relatively unimportant to a firm (a low ω_f^i) will not lower the CI by very much, whereas small gaps on assets deemed very important (high ω_f^i) will decrease the CI much further. Similarly, if the community has no gaps on any very important asset, the index will have a high value. Thus, CI_f measures the initial business environment, or fitness, of a community to host a given firm. In comparing across F firms, the raw CI_f measure is an informational tool allowing the planner to identify and target businesses that are most compatible with the community's current asset stock.

However, communities may not wish to use public resources to pursue every firm identified as highly compatible. Production activities by firms come with a set of attributes unique to each firm (e.g., good employment benefits or high levels of pollution) that may or may not be desirable to a community. Let the attributes for firm f be defined by a K -dimensional vector \mathbf{B}_f , each element (b_f^k) of which reflects the benefits that the community will experience if the firm f were to start up, expand, or locate in the community. A general index of desirability can be constructed for each firm:

$$(3) \quad DI_f = DI(b_f^1, b_f^2, \dots, b_f^K; \boldsymbol{\varphi}),$$

² For example, the reference value selected for any asset could be the greatest value found across all US counties.

where b_f^k is the amount of benefit k brought to the community by firm f and φ is a conformable K -dimensional vector of parameters reflecting the relative weight given by the community to benefit k . The elements of φ are assumed constant across all firms: If a community values a benefit highly (e.g., that firms will predominantly hire labor from the existing local labor pool) then, all else equal, the community is indifferent among the firms providing this highly valued benefit. Similarly, if two firms emit the same type and quantity of air pollutant then, all else equal, the community would be indifferent to the firms generating this negative benefit, giving the same (presumably) low weight to both firms.

The raw values of the CI and DI can be used in conjunction to identify firms for which the community's existing asset stock is attractive and to identify those businesses that are attractive to the community because of the benefits they confer on the region.³ A key shortcoming of the raw CI is that it does not identify the most constraining elements of the community's asset stock A ; that is, a low CI_f value could be the result of gaps associated with important assets whose values could be adjusted easily, or the low value could result from gaps for important assets whose stock is relatively immutable. To guide community economic development efforts, it would be useful to define a function that identifies the most constraining, and changeable, asset gaps. Further, this function should weight gaps for firms deemed more desirable by the community more heavily than gaps for firms that are considered less desirable.

We can generate a community development guidance function that is composed of the set of CI and DI measures for F firms, $G = g(CI; DI)$, where the community's stock of each asset in A is a choice variable for the planner and the community-generated DI provides a set of firm-level desirability weights. Changing the stock of any asset will change the compatibility index value for multiple firms, so we define $G(\cdot)$ as the sum across all firms:

$$(4a) \quad G = \sum_{f=1}^F [CI_f(A; A_R, \omega_f); DI_f],$$

where one may think of $G(\cdot)$ as the aggregate attractiveness of the community to all potential businesses, weighted by the community's relative desire for any given firm.

The first derivative of this function yields the key measure of interest, namely, the DI -weighted sum of the marginal changes in compatibility due to a change in the level of asset a^i :

$$(5a) \quad \frac{\partial G}{\partial a^i} = \sum_{f=1}^F \frac{\partial CI_f}{\partial a^i} = \sum_{f=1}^F c_f^i(A; /, A_R, /, \omega_f, DI_f).$$

For each of M assets, equation (5a) has two key features. First, each $c_f^i(\cdot)$ term is explicitly weighted by the desirability of firm f to the community. Even if changes in the stock of a given asset greatly improve the value of the compatibility index for a given firm, less desirable firms will receive less weight in the summation than those with attributes the community has deemed more desirable. Second, the sum across all firms for each a^i yields a cardinal measure of the degree to which the stock of an asset is restricting a community's economic development. High values for equation (5a) imply that a given asset stock, A , restricts a greater number of firms, or it restricts a smaller number of highly desirable firms. Alternatively, one may think of equation (5a) as the marginal impact of relaxing the asset constraint. Regardless, the value of equation (5a) for each of the M assets in a community allows one to rank assets according to the degree to which they constrain, or contribute to, the potential for economic development.

Data and an Operational Model

While the theoretical model presented above can be made operational in any number of ways, we provide an empirical application of the guidance function model using functional forms and data

³ Harris et al. (2012) provide an example of this approach.

Table 1. Compatibility Index Assets, Classified by Theoretical Approach

Neoclassical	
Transportation and logistics	
Access within 30 minutes to interstate highway	Access within 30 minutes to package freight services
Access within 30 minutes to railhead or rail spur	Access within 30 minutes to rail freight
Access within 30 minutes to passenger air services	Access within 30 minutes to port or harbor facilities
Access within 30 minutes to international trade port	Access, within 1 day, to your customers
Access, within 1 day, to the suppliers you need	
Labor inputs	
Availability of managerial workforce	Availability of unskilled workforce
Availability of skilled workforce	Favorable local labor costs
Nonlabor inputs	
Access to 3-phase electric power	Availability of cell phone service
Access to fiber optic lines	Availability of local public transportation
Availability of high-volume water supply	Possibility for future expansion at site
Availability of wastewater disposal	Availability of high-speed internet access
Availability of solid waste disposal	Access to natural gas pipeline
Taxes	
Favorable workers compensation tax rate	Favorable local business tax rates
Institutional	
State and local government incentives	Availability of specialized job training programs
Availability of union labor	Availability of short- and long-term financing
Existence of a business/trade association	
Behavioral	
Low crime rate	Retail shopping opportunities ^a
Availability of affordable housing	Quality of educational system (K–12) ^a
Clean air and water ^a	College or university
High quality natural ecosystem ^a	Availability of quality health care ^a
Outdoor recreational opportunities ^a	Availability of public safety services ^a
Social and cultural opportunities ^a	

Notes: ^aMeasured by ASAP Community Goal Survey.

collected through the USDA-funded Extension and research program known as the Area Sector Analysis Process (ASAP).⁴ ASAP draws upon data from three primary sources and numerous secondary sources. Primary sources include: (i) the ASAP Business Location Choice Survey (BLCS), (ii) the ASAP Community Goal Survey (CGS), and (iii) the ASAP Community Asset Inventory (CAI) which are all described in detail in Bordigioni et al. (2020). Secondary data sources include regional- and national-level IMPLAN input-output models as well as various national, state, and local data (e.g., those provided by state tax authorities, GIS programs, the Bureau of the Census, and the Bureau of Economic Analysis).

In the BLCS, firm representatives are asked about the importance of 41 community assets—including physical infrastructure, economic infrastructure, and quality of life—in making their

⁴ Complete technical details about ASAP data collection and analytic output, including primary survey instruments, may be found in Bordigioni et al. (2020).

Table 2. Desirability Index Goals and Indicators

Goal	Measurement of Benefit, b_{fj}^{gh}
Economic Quality	
Every new job generates additional jobs in the community ^a	No. of additional jobs created per firm for industry j
New businesses return profits to the community ^b	Profit margin in industry j
New businesses hire locally ^c	Percentage of new hires in industry j made from local labor pool
New businesses buy locally ^b	Proportion of input expenditures made locally in industry j
New businesses increase the average local wage ^b	Wage rate in industry j
Environmental Quality	
New businesses do not pollute the water ^a	Average per firm total toxic releases to water resources in industry j
New businesses do not release toxic chemicals in the air ^a	Average per firm total toxic releases to air resources in industry j
New businesses stay in compliance with hazardous waste management ^b	Average cleanup expenditure per pound of toxic material released by industry j
New businesses do not emit greenhouse gas ^b	Percentage share if industry j in total GHG emissions
New businesses do not develop undeveloped land ^c	Land area needed for relocation
Social Quality	
New businesses increase the local tax base ^a	Additional tax revenue generated per firm in industry j
New jobs are full-time ^d	Proportion of full-time jobs in industry j
New jobs offer benefits (health and/or retirement) ^d	Proportion of jobs in industry j with benefits
New jobs provide training programs ^d	Proportion of jobs in industry j that come offer training programs
New businesses support community activities ^d	Proportion of businesses in industry j that support community activities

Notes: ^aIndustry-level data, adjusted for firm size.

^bIndustry-level information, independent of firm size.

^cFirm-specific information, varies with firm size.

^dFirm-specific information, independent of firm size.

expansion and relocation decisions (Table 1). Firms are also asked about the employee benefits they offer and the firm's past support for local public goods such as recreation and cultural activities.⁵ The CGS asks community respondents to rank the importance of 15 economic, environmental, and social aspects of economic development (shown in Table 2, column 1) and to assess the relative quality of some community QOL assets. The CAI, which measures access and quality of transportation, energy, water and waste infrastructure, and other public services (e.g., cell phone and high-speed internet), as well as state and local economic development policies, is almost invariably completed by a regional economic development official familiar with the region of study.

ASAP is procedurally implemented over a period of 3–6 months. Under the combined direction of an economic development official and an ASAP facilitator, a local steering committee composed of roughly 10–25 community members is assembled. The development director and steering committee hold regular meetings during which the facilitator presents the six ASAP modules. Module 1 provides a general overview of ASAP and sustainable community economic development. Module 2 instructs the steering committee on protocols for primary data collection; CGS and CAI data collection is initiated after this module. Depending on community preference, CGS data collection may occur with paper surveys, online, or both. During Module 3, local and national economic development and demographic

⁵ First implemented in 2003, new observations are periodically added to the BLCS database as funding becomes available. Sampling frames include Dun and Bradstreet, Reference USA, and industry specialists. As of June 2017, the database contained observations from 2,502 firms representing 276 4-digit NAICS sectors.

trends are presented and any paper survey instruments are collected. The CGS and CAI primary data are then combined with the BLCS database and secondary data to calculate the *CI* and *DI*.

The output from the ASAP analysis is presented during Module 4, when the steering committee is provided the *CI* and *DI* rankings for all 276 industrial sectors in the BLCS database.⁶ Sectors with the highest *CI/DI* combinations are highlighted, along with the *CI/DI* for industries that have traditionally formed the economic base of the community (e.g., agriculture and mining). The steering committee is then tasked with selecting approximately a dozen of the 276 sectors for further research. During Module 5, the committee receives a detailed report about these targeted sectors. The sixth and final module establishes a community-specific framework to implement economic development objectives identified by ASAP.

Empirical measures of asset gaps (equation 1) and industry benefits (column 2 of Table 2) underwent a significant refinement in March 2011, so our analysis is restricted to the 18 communities participating in an ASAP program between 2011 and 2019. Some 2,339 CGS responses were received from these 18 communities (an average of 130 per community, with a minimum of 39 responses and a maximum of 271).

Calculating the Compatibility Index

Table 1 lists the 41 community assets used to calculate *CI*, classified according to the three economic development theories discussed previously. Information on all assets for the neoclassical and institutional models—plus crime rates, affordable housing, and access to 4-year higher education institutions—was obtained from secondary data sources. Many asset variables are coded as binary variables, where a 1 indicates the presence of an asset and a 0 denotes its absence. Following equation (1), local labor costs, labor skills, taxes, crime rates, and housing costs were measured relative to a reference community. Secondary data sources for eight QOL assets listed in Table 1 are not available for many rural communities. Ideally, secondary measures of the QOL attributes would be used, but measuring the overall quality of the “natural ecosystem,” “air and water,” or “social and cultural opportunities” is difficult even for regions rich in secondary data. ASAP relies instead on its Community Goal Survey to provide proxy values for these assets. Our solution may be second-best, but it seems reasonable for us to assume that local residents will know best, for example, whether there are local air or water quality problems, local forests are beset with pests, or local drinking water supplies must be filtered. Thus, measured asset levels for eight QOL measures (as indicated in Table 1) represent the average perceptions of residents.

The importance of any given asset to a firm is obtained via the ASAP Business Location Choice Survey. For each of the 41 assets listed in Table 1, a respondent firm was asked to use a 4-point scale to indicate the relative importance of that asset to its operations and its expansion and location decisions, ranging from “not at all important” to “very important.” The response indicated by firm f for asset i was assigned one of four possible weights, $\omega_f^i \in \{0.25, 0.50, 0.75, 1.00\}$, with weights increasing monotonically by importance. The compatibility index for firm f has an explicit functional form:

$$(6) \quad CI_f = \alpha_f \sum_{i=1}^M (2a^i / a_R^i)^{\omega_f^i},$$

where α_f represents space requirement gaps at the location (e.g., square footage of warehouse or manufacturing space) measured as the proportion of space required by firm f relative to the amount currently available in the community. Given our focus on community-level assets, we assume that commercial space requirements provided through private markets are satisfied ($\alpha_f = 1$). The compatibility index is calculated for each firm in the database and measures the fitness of the community's current asset base to host the firm.

⁶ ASAP calculates *CI* and *DI* for each firm; the Module 4 report calculates industry-level *CI* and *DI* measures as the mean for all BLCS firms within each 4-digit NAICS industry.

Desirability Index

The information on a community's economic development goals is obtained from the ASAP Community Goal Survey, which elicits community members' preferences with respect to three broad goals: economic, environmental, and social (Table 2, column 1). Within each of the three major goals (g) are five indicators (h) that gauge the contribution toward each goal. Importance weights for goals g and indicators h are calculated using the Analytic Hierarchy Process (AHP) algorithm (Saaty, 1990; Mu and Pereyra-Rojas, 2017).⁷ Let the weight for any goal be denoted by γ^g and the weight for any indicator be denoted by γ^{gh} . Goal and indicator weights must conform to AHP restrictions, where the ASAP Community Goal Survey sets $H = 5$ and $G = 3$:

$$(7) \quad \gamma^g = \sum_{h=1}^H \gamma^{gh} \text{ and } \sum_{g=1}^G \gamma^g = 1.$$

Column 2 of Table 2 shows how ASAP measures the marginal contribution, or marginal benefit, of firm f to each goal/indicator combination. Some indicator measures are constant across all firms within an industry whereas others are firm-specific. We depart from the general notation used for benefits in the previous section to distinguish benefits brought by a firm to each goal and indicator, b_f^{gh} . Following Halbrendt, Zheng, and Lucas's (2000) functional form, ASAP defines the Desirability Index for any firm f as

$$(8) \quad DI_{fw} = \prod_{g=1}^G \left[\prod_{h=1}^H (b_f^{gh})^{\gamma^{gh}} \right]^{\gamma^g}.$$

An Operational Economic Development Guidance Function

Following ASAP databases and procedures, our development guidance function is calculated at the firm level for each community. One may use the DI measures as weights on the CI measures in any number of ways; we choose to use an exponential approach:

$$(4b) \quad G(CI, DI) = \sum_{f=1}^F (CI_f)^{DI_f} = \sum_{f=1}^F \left[\sum_{i=1}^M (2a^i / a_R^i)^{\omega_f^i} \right]^{DI_f}.$$

Equation (4b) has appealing properties. First, for any given CI value, firms that are considered more desirable add more to community development potential than firms with attributes considered less desirable. In fact, a firm with a low CI and high DI may contribute more to development potential than a firm with a higher CI but lower DI . Moreover, the first derivative with respect to any a^i is positive (improving an asset increases community development potential). The second derivative of equation (4b) is negative if, as is highly likely, at least one firm considers at least one asset to be less than "very important" (i.e., at least one $\omega_f^i < 1.0$). This assures that development potential is not unbounded: The function is concave and improving an asset has diminishing returns as the level of the local asset increases.⁸

⁷ AHP is a very popular multiattribute decision tool used to analyze complex decisions by making pairwise comparisons among goals and, within each goal, pairwise comparisons between every indicator. We use standard AHP calculations to measure importance weights (γ^{gh}) for each community (Bordignon et al., 2020).

⁸ Equation (4b) could be constructed in several ways. For example, one could use the DI_f as linear weights on the CI_f (e.g., $G(\cdot) = \sum_{f=1}^F DI_f \times CI_f$) rather than as exponents. Another approach might weight firms differently. For example, some communities have asked that firms in industries that have historically supported the community (e.g., farming, ranching, or mining) be given greater weight in the analysis than the DI would otherwise suggest. While alternative functional forms may be used, we believe the specific functional form presented in equation (4b) represents a reasonable first approach.

Table 3. Descriptive Statistics for Compatibility and Desirability Indices, by Community

Community	Year	No. of Firms (<i>F</i>) in BLCS Database	Compatibility Index (<i>CI_f</i>)					Desirability Index (<i>DI_f</i>)			
			$\sum_{f=1}^F CI_f$	Mean	Min.	Max.	Std. Dev.	Mean	Min. ^a	Max.	Std. Dev.
Battle Mountain, NV	2011	1,700	43,861.78	25.801	0.378	47,569	15.299	0.022	0.000	0.361	0.022
Beaver, UT	2017	2,502	71,940.47	28.753	0.535	47,618	13.652	0.007	0.000	0.159	0.010
Carbon, UT	2018	2,502	92,628.25	37.022	3.089	47,838	6.982	0.008	0.000	0.192	0.011
Cibola, NM	2016	1,949	25,683.92	13.178	0.000	45,395	16.529	0.005	0.000	0.241	0.011
Emery, UT	2018	2,502	50,329.56	20.236	0.262	49,512	15.774	0.017	0.000	0.330	0.019
Escalante, UT	2016	1,949	29,454.61	15.113	0.207	39,594	12.358	0.007	0.000	0.218	0.014
Grand, UT	2016	1,949	69,179.87	35.495	1.374	50,228	10.960	0.023	0.000	0.250	0.014
Juab, UT	2017	2,248	87,922.44	39.111	1.815	53,934	10.509	0.011	0.000	0.222	0.013
Kingman, AZ	2012	1,756	75,933.83	43.242	13.463	53,070	3.265	0.010	0.000	0.379	0.017
Lewiston, UT	2016	1,949	38,021.86	19.508	0.179	49,325	15.262	0.007	0.000	0.195	0.013
Millard, UT	2017	2,248	94,702.64	42.128	9.525	51,764	4.057	0.002	0.000	0.089	0.004
Piute, UT	2017	2,248	39,117.27	17.401	0.227	38,442	12.794	0.002	0.000	0.132	0.007
San Juan, UT	2017	2,502	84,084.03	33.607	4.255	40,875	4.581	0.011	0.000	0.263	0.013
Sanpete, UT	2017	2,502	70,213.11	28.063	0.976	39,211	9.304	0.008	0.000	0.227	0.011
Sevier, UT	2017	2,502	92,481.50	36.963	8.388	44,105	3.494	0.003	0.000	0.140	0.006
Wayne, UT	2015	1,898	33,092.48	17.435	0.321	34,556	11.422	0.018	0.000	0.275	0.020
Willcox, AZ	2019	2,502	86,089.84	34.408	2.103	44,428	7.067	0.007	0.000	0.198	0.009
White Pine, NV	2015	1,898	50,224.08	26.462	0.908	40,840	10.949	0.110	0.000	0.287	0.029

Notes: ^aRounded to three decimals; the precise minimum value is greater than zero.

Taking the partial derivative of equation (4b) with respect to each asset level α^i yields the marginal contribution of that asset to the overall development potential of the community:

$$(5b) \quad \frac{\partial G}{\partial \alpha^i} = \sum_{f=1}^F \left[DI_f \times CI_f^{DI_f-1} \times \frac{\partial CI_f}{\partial \alpha^i} \right].$$

Equation (5b) is presented under the assumption that the level of each asset can be measured along a continuous scale. If an asset is measured discretely as 0 or 1, the marginal contribution of moving from 0 to 1 can be calculated with a discrete difference function rather than a derivative. Higher values for equation (5b) indicate that increasing the stock of asset i will relax an important development constraint and increase the value of $G(\cdot)$; efforts to improve the level of the asset will provide a wider variety of development options. Lower values of equation (5b) indicate that the asset is currently not a constraint or that improving its level will not appreciably increase development options. Based on equation (5b), ASAP's analytical output ranks the estimated marginal impact of changing asset levels when considering a suite of specific regional economic development strategies.

Empirical Results

Our analysis relies upon data collected between 2011 and 2019 for 13 rural counties and 5 rural towns located in four states.⁹ All of these US Mountain West communities have access to an abundance of public lands and offer high-quality environmental and recreational resources. Table 3 reports descriptive statistics for the compatibility and desirability indices for each of our 18 communities. One will also note that the number of firms in the BLCS database increases over time as more firms are surveyed (see footnote 5). Table 3 also shows that the mean CI values across the communities range from around 13 to 42, whereas the mean DI values range from about 0.01 to 0.11.

For any given number of firms in the BLCS database (and in the absence of any weighting by desirability to the community), a higher cumulative sum of the CI_f indicates greater raw economic development potential for a community relative to one with a smaller cumulative sum. Consider the cumulative CI values for Utah's Millard (94,703) and Piute (39,117) Counties. The economies of both counties are based primarily upon agriculture and ranching. Relative to Millard County, Piute County has asset advantages in its lower prevailing wage rate, more affordable housing, and perceived higher quality K–12 school system. In contrast, Millard County is located closer to a major population center and has better access to package freight services and a railhead, high-volume water supply and waste disposal, a more educated populace and a lower crime rate, and better perceived shopping opportunities, access to health care, and public safety services. These numerous advantages result in Millard County being compatible with a wider variety of industries than Piute County, which is reflected in a higher cumulative CI score.

The data reported in Table 3 demonstrate variation sufficient to assess the guidance function and constraint rankings using measures of criterion validity, internal validity, and external validity. Criterion validity involves comparing our asset ranking results for each community to external metrics that measure the same construct (e.g., government statistics). Our internal validity checks will assess the degree to which asset constraint rankings for one community are correlated with similar communities in our study. External validity is assessed by comparing our results to those of other development studies.

⁹ Communities include counties in Nevada (White Pine), New Mexico (Cibola), and Utah (Beaver, Carbon, Emery, Millard, Grand, Juab, Piute, San Juan, Sanpete, Sevier, and Wayne), as well as towns in Arizona (Kingman and Willcox), Nevada (Battle Mountain), and Utah (Escalante and Lewiston).

Criterion Validity: Comparing Ranked Constraints to Known Attributes of Communities

Equation (5b) was used to calculate the marginal impact of 18 community assets measured continuously, which were then ranked from most restrictive to least restrictive for each community.¹⁰ Table 4 reports the asset rankings for the 18 communities, where the asset ranked “1” is the most restrictive (greatest value for equation 5b) in that community and the asset ranked “18” is the least restrictive (lowest value). Assets are arranged in Table 4 according to the mean ranking across all communities, from most restrictive to least restrictive. The guidance function approach reveals that the four most constraining assets in our Mountain West communities are, in order, an adequate managerial workforce, local business taxes, availability of quality health care, and the prevailing worker’s compensation premium rate. An adequate managerial workforce, measured in ASAP by the percentage of local residents having at least a 4-year degree, had an average rank of 3.0 across the 18 communities. For all but three communities, this asset was among the top five most constraining. The three communities for which this was not revealed to be an important constraint were Lewiston, Utah (located within 30 minutes of a doctoral-granting university, where the asset ranked 8th) and Grand (9th) and Wayne (7th) Counties in Utah, which have enjoyed national park-related amenity migration by highly educated migrants. In Cache County, home to Lewiston, 38.3% of the population has a BS degree or higher, compared to the national average of 32.1% (Headwaters Economics, 2021a). Grand County, at almost 29%, comes close to the national average, whereas Wayne County is a bit lower (23%). The proportion of the population attaining a BS degree or higher in the remaining 15 study regions is 18.1%.

Among other high-ranking constraints, local business taxes and worker’s compensation rates were considered a constraint everywhere except communities in Nevada (Battle Mountain and White Pine County), where tax revenues rely more heavily upon the gaming industry. Finally, access to quality healthcare was consistently ranked as a top constraining asset, which is not a surprise for lightly populated rural communities with limited ability to offer a broad suite of medical services. The four communities in our sample that host a nonfederally owned, short-term acute care hospital (Carbon and Sevier Counties in Utah, and Arizona’s Willcox and Kingman) ranked health care as less of a constraint than the typical community in the sample. Curiously, residents of one of the most remote of our study communities, the town of Escalante, in Garfield County, considered access to health care to be the least constraining (ranked 7th) of all of the communities. In the year prior to participation in the ASAP program, Escalante had, after many years of effort, opened a local health clinic. Though the clinic offers a relatively narrow range of medical services, its presence in the community has relieved residents of a long drive (>1 hour) for basic medical needs. Residents thus perceive this asset to be less constraining than it previously had been.

The next most constraining set of assets included the crime rate and public safety, retail shopping opportunities, labor costs, a quality K–12 school system, and access to customers and suppliers. The relatively high rankings of crime and public safety as a development constraint were not highly correlated ($\rho = 0.15$) with county-level violent crime rates (County Health Rankings & Roadmaps, 2022).¹¹ Under the assumption that labor costs rise as unemployment falls, the ranking of labor costs as a constraint is reasonably well correlated ($\rho = 0.53$) with county unemployment rates: As the rate of unemployment increases, labor costs in the community are ranked as less restrictive. Retail shopping opportunities are ranked as a constraint in those communities actively working

¹⁰ These 18 assets are measured as continuous variables; as noted in the text, the analysis can also be applied to assets measured discretely. Our approach is equivalent to assuming that discretely measured assets (e.g., access to an interstate, railroads, airports, pipelines, high-volume water, and many others appearing in Table 1) are taken as given and unlikely to be under the control of local economic development officials.

¹¹ Our external measure of crime is the mean of the 2014 and 2016 violent crime rates (County Health Rankings & Roadmaps, 2022). The relatively small populations of rural counties mean that an increase of one or two violent crimes in a given year can be reflected as volatility in the measured crime rate, which is the number of violent crimes per 100,000 people. We are unable to ascertain whether this is the case in our study communities.

Table 4. Ranking of Asset Constraint, by Study Region

Assets	Mean Rank	Battle Mtn, NV	Beaver, UT	Carbon, UT	Cibola, NM	Emery, UT	Escalante, UT	Grand, UT	Juab, UT	Kingman, AZ	Lewiston, UT	Millard, UT	Piute, UT	San Juan, UT	Sanpete, UT	Sevier, UT	Wayne, UT	Wilcox, AZ	White Pine, NV
Managerial workforce	3.00	3	2	1	1	2	2	9	1	2	8	1	2	5	2	1	7	2	3
Favorable local business tax rates	3.33	12	1	4	2	3	3	3	2	1	1	2	4	4	1	2	1	4	10
Quality health care	4.28	5	3	6	5	4	7	4	3	6	2	3	3	6	3	5	3	5	4
Workers' compensation tax rate	5.89	8	4	7	3	8	9	7	5	4	3	4	7	8	4	4	6	7	8
Low crime rate	6.56	9	7	3	4	10	11	10	4	3	6	8	5	3	7	3	11	1	7
Retail shopping opportunities	6.56	2	8	10	9	5	1	8	9	10	7	10	1	2	9	14	2	6	5
Public safety services	6.72	7	5	9	6	9	10	5	6	8	5	7	6	7	5	7	5	8	6
Favorable local labor costs	7.72	6	6	8	8	6	8	11	7	9	4	5	8	10	6	6	10	10	11
Quality of K-12 education	8.33	11	9	11	7	11	6	6	8	5	9	6	12	11	8	8	4	9	9
Access to customers	9.44	4	10	13	13	13	4	2	13	13	14	11	11	3	11	10	9	14	2
Access to supplies	9.50	1	11	15	14	12	5	1	16	12	17	12	9	1	14	9	8	13	1
Skilled workforce	10.94	14	12	5	10	7	12	14	12	11	11	9	10	12	10	11	12	12	13
Clean air and water	13.00	13	13	12	11	14	14	13	10	15	13	14	14	13	13	13	14	11	14
Affordable housing	13.50	16	14	14	15	16	13	12	11	14	10	13	13	14	12	12	13	16	15
Unskilled workforce	14.28	17	15	2	18	1	17	17	17	17	12	17	18	18	17	16	17	3	18
Social and cultural opportunities	14.44	10	16	17	16	15	15	16	15	7	16	15	15	15	15	15	15	15	12
Quality of natural ecosystem	15.72	15	17	16	12	17	16	15	14	16	15	16	16	16	16	17	16	17	16
Outdoor recreation opportunities	17.78	18	18	18	17	18	18	18	18	18	18	18	17	17	18	18	18	18	17

to build larger tourism sectors, such as Escalante, Utah (ranked 1st), and Piute (1st), San Juan (2nd), and Wayne (2nd) Counties. Wayne County also ranked its K–12 school system as its 4th most restrictive asset. Despite benefiting from amenity migration connected to a national park within its borders, the county population is older and there are fewer teenaged residents than in past decades. The local school district is struggling to find enough students to support the local high school.

The greatest cross-community variation in the asset rankings is found with access to customer and supplier markets. One feature of ASAP worth noting is that the measurement of these two assets is the same for a given community (distance to a community of greater than 50,000 people), such that differences in ranking solely reflect differences in firms' weighting parameters (ω_f^i) and firm desirability to the community (DI_f). Communities with market access as a major constraint tend to be located very far from the nearest Metropolitan Statistical Area (MSA). Battle Mountain and White Pine County in Nevada and Escalante, Utah, rank market access as their most restrictive asset: Each is located more than 3 hours driving time to the nearest MSA (Reno, Nevada; Salt Lake City, Utah; and Saint George, Utah, respectively). In contrast, rural communities that ranked access to markets as not restrictive were generally located in counties adjacent to large MSAs. Cibola County, New Mexico, (access ranked 14th) is just west of Albuquerque; Willcox, Arizona, (13th) is just east of Tucson; and Lewiston, Utah, (17th) is located within the Logan, Utah–Idaho MSA.

Skilled and unskilled labor supplies have mean asset constraint rankings that are relatively low (the 12th and 15th most restrictive assets, respectively). The proportion of the study regions' skilled labor population (88.2%) and its unskilled labor population (11.8%) are very close to national proportions (88.0% and 12.0%, respectively).¹² The rankings for unskilled labor catch the eye because it appears to be a very restrictive asset in three study communities (Carbon, Emery, and Willcox) but nowhere else. As noted in the Data section, the reference measures used to calculate asset levels of a community are periodically updated, which changes the denominator in the equation (1). While the reference values for all assets except unskilled labor remained relatively constant with the 2018 update, the reference value for unskilled labor was noticeably greater than in previous years, making unskilled labor in the 2018 and 2019 ASAP communities seem more restrictive than it likely is (Bordigioni, personal communication, 2020).¹³

The relative abundance of QOL assets favors nearly all of our study communities so, collectively, the guidance function did not reveal these to be important constraints to economic development. Housing prices, measured by either monthly rents or monthly mortgage payments, are lower in every ASAP study region relative to the national average (Headwaters Economics, 2021a). Further, all study communities are adjacent to federally owned public lands and have access to high-quality environmental and recreational resources. Relative to the national average of just over 27% of a US county being federally owned and managed for public access (with a much lower median value), the communities reported in this study average over 69% of their area managed by the US Forest Service, the Bureau of Land Management, or the National Park Service (Headwaters Economics, 2021b). One surprise, though, was the relatively low ranking of social and cultural opportunities as a constraint across all communities (ranked an average of 16th most constraining). The majority of the study communities are located 90 minutes or more from major metropolitan areas offering a rich array of cultural opportunities. The fact that the relative lack of social and cultural opportunities was not a constraint suggests that residents are satisfied with the current level of this asset and that firms place relatively little weight on this asset.

¹² ASAP measures labor skill by educational attainment, with college graduates classified as managerial, high school graduates classified as skilled, and those without a high school degree as unskilled.

¹³ We strongly suspect that the 2018 reference value for unskilled labor was subject to measurement or reporting error in the secondary data source used by ASAP.

Table 5. Correlation among Asset Constraint Rankings, Selected Utah Study Regions

Economic Base	Escalante, UT	San Juan, UT	Wayne, UT	Grand, UT	Carbon, UT	Emery, UT	Beaver, UT	Juab, UT	Millard, UT	Sanpete, UT
	Tourism/Agriculture				Energy		Agriculture			
Southern Utah										
San Juan	0.868									
Wayne	0.874	0.773								
Grand	0.820	0.854	0.837							
Central Utah										
Carbon	0.337	0.312	0.381	0.172						
Emery	0.507	0.374	0.538	0.284	0.884					
West Central Utah										
Beaver	0.765	0.725	0.856	0.705	0.672	0.694				
Juab	0.593	0.551	0.725	0.494	0.655	0.556	0.915			
Millard	0.734	0.624	0.818	0.635	0.641	0.637	0.959	0.917		
Sanpete	0.697	0.626	0.822	0.618	0.651	0.626	0.973	0.959	0.979	
Sevier	0.651	0.675	0.695	0.653	0.655	0.548	0.924	0.884	0.930	0.917

Notes: Table A1 reports correlations among all communities. All reported correlations are significant at the 5% level.

Internal Validity: Cross-Community Correlation among Asset Constraints

Given the cross section of communities that have participated in an ASAP program, we can search for communities that share similar constraints to economic development. Table 5 reports simple correlation coefficients for 11 Utah communities, where we focus upon commonalities found in the tourism, energy, and agricultural regions of Utah.¹⁴ The town of Escalante and San Juan and Wayne Counties share asset constraint correlation coefficients between 0.77 and 0.87. These communities, all located in the Red Rock Canyon country of southern Utah, have abundant outdoor recreation assets upon which they are seeking to develop tourism-related industries to complement their existing economic base. Each of these communities also shares a high correlation among asset constraints with economically thriving Grand County, home to the Red Rock outdoor recreation destination of Moab.

In contrast, the correlations between the tourism communities and the struggling energy-based economies in Carbon and Emery Counties, which range between 0.17 and 0.54, are relatively low. Carbon and Emery, though, have a correlation coefficient of 0.88, indicative of the similar asset constraints and community preferences in counties whose economies have historically relied upon energy extraction. Finally, the correlations among asset constraint rankings in five contiguous counties of West Central Utah are very high (0.88 to 0.97). Each of these counties has an economy based primarily upon agricultural production (beef, pork, and hay) and has comparatively limited tourism or fossil fuel assets.¹⁵

¹⁴ The full set of correlations among all communities and constraints may be found in Appendix Table A1.

¹⁵ We tested the sensitivity of asset constraint correlation to the possibility of measurement error for unskilled labor in ASAP values for Carbon and Emery Counties. After dropping unskilled labor from the asset list, constraints for Carbon and Emery remain highly correlated (0.87); correlations with all other communities appearing in Table 5 increase, as expected. Constraints for the energy counties remain relatively uncorrelated from those of the tourism counties but become much more correlated with the agricultural counties (generally greater than 0.80).

External Validity: Comparing Ranked Constraints to Other Studies

Of the 18 assets, eight are associated with the neoclassical economic model that emphasizes costs and 10 are associated with the behavioral model that highlights the importance of quality of life. Three of the four most restrictive assets are associated with the neoclassical development model, while the fourth (health care) is featured in the behavioral model. Skilled and unskilled labor supplies are the only assets typically associated with the neoclassical model with mean rankings that are relatively low (the 12th and 15th most restrictive assets respectively). Five of the six least restrictive assets (ranked, on average, 13th or lower) are QOL measures typically associated with the behavioral approach to economic development (outdoor recreation is the least constraining community asset, followed by quality ecosystems, social and cultural opportunities, affordable housing, and clean air). This result is similar to that found by Love and Crompton's (1999) study of firms relocating to or within Colorado, where QOL measures ranked behind those generally associated with the neoclassical and institutional models.

Conclusion and Discussion

The literature has found the effectiveness of specific policies associated with the major theoretical approaches to economic development to be highly variable, where a policy works in one area but not another. Rickman and Wang (2020) assert that context matters; the success of a policy in encouraging business expansion and location depends heavily upon the "specific circumstances" within which that policy is applied. In this study, we have proposed an approach that controls for those specific circumstances using a development guidance function that includes measures of compatibility between firms' assets needs and what is available in a community. Further, public efforts at economic development require the support of the local community, so we weigh the compatibility index by a desirability index to capture the degree to which firms that may locate or expand in the region confer development benefits that are preferred by the community. Our construction of the guidance function is but one way to approach the problem of identifying key development constraints; others may choose different methods to calculate asset gaps or weight community desires. Regardless, our study contributes to relatively undeveloped literature investigating the marginal impact of business climate factors on local communities and models that capture the trade-off between business needs and community goals (Salaghe et al., 2020).

Our empirical analyses provide support for the Rickman and Wang (2020) contention that context matters, that communities vary in the constraints they face, and our hypothesis that one can measure the relative degree to which constraints matter. We have found that the assets most closely identified with the neoclassical approach to economic development were most constraining; three of the top four constraints were an adequate managerial workforce, business taxes, and workers' compensation taxes. Other serious constraints to development were most closely related to the behavioral approach to economic development. These constraints, such as access to health care, retail shopping opportunities, public safety concerns, and quality K–12 education, are likely associated with the rural nature of our 18 communities. We suspect that assets such as health care and retail shopping would rank lower as constraints in more urban and suburban communities.

ASAP's attractiveness to regional economic development directors in recent years provides a nice gauge of its value, but an appeal to its popularity is only one metric of value. Our second goal was to assess the validity of ASAP output by comparison to external measures that should be related to the identified constraints (i.e., we used criterion validity). An adequate managerial workforce was less of a constraint in communities where a highly educated populace was present; access to customer and supplier markets were tight constraints for communities located furthest from MSAs; labor costs, as a constraint, were correlated with the unemployment rate; the quality of natural ecosystems and outdoor recreation opportunities were not constraining to any of the communities, all of which are located in regions with abundant public lands. Validity of ASAP output was also assessed by

measuring how well the constraint rankings for one community were correlated with the rankings of other communities. Again, the pattern accords with what is known about the communities. Counties seeking to build tourism industries were found to have a similar ranking of development constraints, as were those communities with economies based on energy extraction or agricultural production.

This implies that state and regional economic development directors can create a suite of targeted development strategies, each crafted to satisfy a roughly common set of community asset constraints and development goals, but that could be applicable to more than one region. For example, the high correlations among development constraints facing communities in Southern Utah suggest that development strategies that proved so successful in Grand County may also be applicable to other southern Utah communities. Further, policy makers can target interventions on asset constraints that yield larger marginal impacts in creating an attractive business environment for desirable industries, such as increased attention to rural health care facilities or creating (and maintaining) an abundant skilled workforce. However, our study reveals only the relative benefits of investing in certain assets, and it does not consider the relative costs of different investments. It may not always be feasible to invest in strategies to improve the status of an asset, even if it would create greater marginal benefits than other assets.

Our analysis also uncovered a number of issues that suggest further refinement of ASAP is needed. First, ASAP treats each community asset as independent of every other asset, with no interactions between them. However, assets may be complements or substitutes for one another. For example, the ability to recruit and maintain a managerial workforce, the most highly ranked constraint, may be complementary to any number of constraining QOL assets, such as access to health care or retail shopping opportunities. While our theoretical model allows for asset interactions, the empirical model does not. A potentially helpful framework for incorporating a more diverse set of community assets and accounting for possible interactions among assets is the community capitals framework (CCF; Flora, Flora, and Gasteyer, 2016; Emery and Flora, 2006; Pigg et al., 2013; Pender, Marré, and Reeder, 2012). CCF organizes assets into categories of natural, cultural, human, social, political, and financial capitals, which collectively form the asset endowments of a community (Pender, Marré, and Reeder, 2012; Emery and Flora, 2006). There has been limited research on the interactions of the capitals, most notably by Pigg et al. (2013), who find the relationships among the various capitals to be complex and suggest that conventional capital groupings may need to be modified in light of the empirical relationships. While our study does not explicitly employ the CCF, many of the assets quantified in the ASAP model can be thought of in terms of community capitals. Further research and development would be needed to merge the two frameworks and explore the interactions between community assets.

A second issue is that the initial asset endowments within a given community are likely to affect how communities rank the quality and quantity of local assets and how people choose to weight each community goal. Neither is likely to be independent of initial asset endowment. Indeed, the successful experience of Escalante, Utah, in securing and staffing a local health facility provides some evidence of an endowment effect. Even with the new facility, the breadth of health care services provided in Escalante lags behind those of many other study communities. Yet Escalante—in an ASAP exercise conducted just 1 year later—rated health care as least constraining of all study regions. Including initial asset endowments, and recent changes in asset levels, would be a fruitful addition to ASAP asset measurement.

Finally, the development of the CBM and ASAP models over more than 2 decades has resulted in a set of fixed weights that are embedded in the internal calculations of the *CI* and *DI* indices, particularly the vector ω , used in the *CI* that to indicate the importance of a given asset to a firm. The elements of ω monotonically correspond to the importance indicated by the firm in the BLCS database, but the values for each element are entirely arbitrary. Any alternative weighting vector, of which there are an infinite number, would also be entirely arbitrary, but there would be value in determining the sensitivity of ASAP industry results and guidance function analysis to the selected weights. We leave this for future updates to ASAP.

References

- Bartik, T. 1991. *Who Benefits from State and Local Economic Development Policies?* Kalamazoo, MI: Upjohn Institute. doi: 10.17848/9780585223940.
- . 2017. *A New Panel Database on Business Incentives for Economic Development Offered by State and Local Governments in the United States*. Presentation to Michigan House Tax Policy Committee, March 15, 2017. Project #34435. Kalamazoo, MI: Upjohn Institute.
- Bordigioni, M., S. Koirala, M. Kobayashi, and J. M. Jakus. 2020. "Area Sector Analysis Process: Technical Documentation. Western Rural Development Center (May)." Available online at <https://www.usu.edu/wrdc/files/news-publications/ASAP-Technical-Documentation-2.pdf>.
- Brouwer, A. E., I. Mariotti, and J. N. van Ommeren. 2004. "The Firm Relocation Decision: An Empirical Investigation." *Annals of Regional Science* 38(2):335–347. doi: 10.1007/s00168-004-0198-5.
- Bruce, D., J. A. Deskins, B. C. Hill, and J. C. Rork. 2009. "(Small) Business Activity and State Economic Growth: Does Size Matter?" *Regional Studies* 43(2):229–245. doi: 10.1080/00343400701808915.
- Buescher, M., P. Sullivan, C. Halbrendt, and M. T. Lucas. 2001. "The Community-Business Matching Project: New Tools for Rural Development." *Journal of Sustainable Agriculture* 17(4): 57–74. doi: 10.1300/J064v17n04_06.
- Bundrick, J., and T. Snyder. 2018. "Do Business Subsidies Lead to Increased Economic Activity? Evidence from Arkansas's Quick Action Closing Fund." *Review of Regional Studies* 48(1): 29–53.
- Byrne, P. 2018. "Economic Development Incentives, Reported Job Creation, and Local Employment." *Review of Regional Studies* 48(1):11–28. doi: 10.52324/001c.8004.
- Conroy, T., S. Deller, and A. Tsvetkova. 2016. "Regional Business Climate and Interstate Manufacturing Relocation Decisions." *Regional Science and Urban Economics* 60:155–168. doi: 10.1016/j.regsciurbeco.2016.06.009.
- . 2017. "Interstate Relocation of Manufacturers and Business Climate." *Review of Urban & Regional Development Studies* 29(1):18–45. doi: 10.1111/rurd.12057.
- County Health Rankings & Roadmaps. 2022. "Violent Crime Rate." Madison, WI: University of Wisconsin Population Health Institute. Available online at <https://www.countyhealthrankings.org/explore-health-rankings/measures-data-sources/county-health-rankings-model/health-factors/social-and-economic-factors/community-safety/violent-crime-rate>.
- Cox, L. J., J. E. Alevy, T. R. Harris, B. Andreozzi, J. Wright, and G. Borden. 2009. "The Community Business Matching Model: Combining Community and Business Goals and Assets to Target Rural Economic Development." In S. J. Goetz, S. C. Deller, and T. R. Harris, eds., *Targeting Regional Economic Development*, New York, NY: Routledge, 255–278.
- Deller, S. C., and S. J. Goetz. 2009. "Historical Description of Economic Development Policy." In *Targeting Regional Economic Development*, New York, NY: Routledge, 17–34. doi: 10.4324/9780203883495-8.
- Eisinger, P. K. 1988. *The Rise of the Entrepreneurial State: State and Local Economic Development Policy in the United States*. Madison, WI: University of Wisconsin Press.
- Emery, M., and C. Flora. 2006. "Spiraling-Up: Mapping Community Transformation with Community Capitals Framework." *Community Development* 37(1):19–35. doi: 10.1080/15575330609490152.
- Flora, C. B., J. L. Flora, and S. P. Gasteyer. 2016. *Rural Communities: Legacy + Change*, 5th ed. Boulder, CO: Routledge. doi: 10.4324/9780429494697.
- Fox, W. F., and M. N. Murray. 2004. "Do Economic Effects Justify the Use of Fiscal Incentives?" *Southern Economic Journal* 71(1):78–92. doi: 10.1002/j.2325-8012.2004.tb00624.x.
- Goss, E. P., and J. M. Phillips. 1994. "State Employment Growth: The Impact of Taxes and Economic Development Agency Spending." *Growth and Change* 25(3):287–300. doi: 10.1111/j.1468-2257.1994.tb00145.x.

- Greenstone, M., R. Hornbeck, and E. Moretti. 2010. "Identifying Agglomeration Spillovers: Evidence from Winners and Losers of Large Plant Openings." *Journal of Political Economy* 118(3):536–598. doi: 10.1086/653714.
- Greenstone, M., and E. Moretti. 2003. "Bidding for Industrial Plants: Does Winning a 'Million Dollar Plant' Increase Welfare?" Working Paper 9844. Cambridge, MA: National Bureau of Economic Research. doi: 10.3386/w9844.
- Guo, H., and S. Cheng. 2018. "Untargeted Incentives and Entrepreneurship: An Analysis of Local Fiscal Policies and Small Businesses in Florida." *Review of Regional Studies* 48:119–135. doi: 10.52324/001c.8009.
- Halbrendt, C. K., Y. Zheng, and M. T. Lucas. 2000. "Identifying Sustainable Businesses For Community Economic Development." Paper presented at the annual meeting of the Agricultural and Applied Economics Association, Tampa, Florida, July 30–August 2. doi: 10.22004/ag.econ.21731.
- Hansen, T. J., and L. Kalambokidis. 2010. "How Are Businesses Responding to Minnesota's Tax-Free Zone Program?" *Economic Development Quarterly* 24(2):180–192. doi: 10.1177/0891242409359407.
- Harris, T. R., L. J. Cox, G. W. Borden, B. Andreozzi, M. Kobayashi, M. Landis, E. Glenn, and D. Albrecht. 2012. "Aligning Community Preferences and Assets with Business Needs to Spark Area Economic Development." *Choices* 27:1–12.
- Headwaters Economics. 2021a. "A Demographic Profile, as Reported in Headwaters Economics Economic Profile System." Available online at <https://headwaterseconomics.org/headwaters/economic-profile-system/>.
- . 2021b. "A Profile of Land Use, as Reported in Headwaters Economics Economic Profile System." Available online at <https://headwaterseconomics.org/headwaters/economic-profile-system/>.
- Hicks, M., and W. Shughart. 2007. "Quit Playing Favorites: Why Business Subsidies Hurt our Econom." In R. S. Sobel, J. C. Hall, and M. E. Ryan, eds., *Unleashing Capitalism: Why Prosperity Stops at the West Virginia Border and How to Fix It*, Morgantown, WV: Public Policy Foundation of West Virginia, 119–130.
- Hipp, J. R., S. A. Williams, Y.-A. Kim, and J. H. Kim. 2019. "Fight or Flight: Crime as a Driving Force in Business Failure and Business Mobility." *Social Science Research* 82:164–180. doi: 10.1016/j.ssresearch.2019.04.010.
- Love, L. L., and J. L. Crompton. 1999. "The Role of Quality of Life in Business (Re)Location Decisions." *Journal of Business Research* 44(3):211–222. doi: 10.1016/S0148-2963(97)00202-6.
- McCann, P., T. Arita, and I. R. Gordon. 2002. "Industrial Clusters, Transactions Costs and the Institutional Determinants of MNE Location Behaviour." *International Business Review* 11(6): 647–663. doi: 10.1016/S0969-5931(02)00043-4.
- McLeman, R., and B. Smit. 2006. "Migration as an Adaptation to Climate Change." *Climatic Change* 76(1):31–53. doi: 10.1007/s10584-005-9000-7.
- Minshall, C., D. Douglas, F. Goodman, and J. Baker. 1971. *An Analysis of the Economic Structure and Industrial Potential of the Four Corners Region*. Battelle Memorial Report. Columbus, OH: Battelle Memorial Institute. Available online at <https://files.eric.ed.gov/fulltext/ED063072.pdf>.
- Mu, E., and M. Pereyra-Rojas. 2017. *Practical Decision Making: An Introduction to the Analytic Hierarchy Process (AHP) Using Super Decisions V2*. SpringerBriefs in Operations Research. Springer. doi: 10.1007/978-3-319-33861-3.
- Pan, Y., T. Conroy, A. Tsvetkova, and M. Kures. 2020. "Incentives and Firm Migration: An Interstate Comparison Approach." *Economic Development Quarterly* 34(2):140–153. doi: 10.1177/0891242420917756.
- Parilla, J., and S. Liu. 2018. *Examining the Local Value of Economic Development Incentives: Evidence from Four U.S. Cities*. Washington, DC: Brookings Institution. Available online at https://www.brookings.edu/wp-content/uploads/2018/02/report_examining-the-local-value-of-economic-development-incentives_brookings-metro_march-2018.pdf.

- Partridge, M., S. Schreiner, A. Tsvetkova, and C. E. Patrick. 2020. "The Effects of State and Local Economic Incentives on Business Start-Ups in the United States: County-Level Evidence." *Economic Development Quarterly* 34(2):171–187. doi: 10.1177/0891242420916249.
- Pellenbarg, P., and E. Wever. 2008. *International Business Geography: Case Studies of Corporate Firms*. Routledge.
- Pender, J., A. Marré, and R. Reeder. 2012. "Rural Wealth Creation: Concepts, Measures, and Strategies." *American Journal of Agricultural Economics* 94(2):535–541. doi: 10.1093/ajae/aar076.
- Pigg, K., S. P. Gasteyer, K. E. Martin, K. Keating, and G. P. Apaliyah. 2013. "The Community Capitals Framework: An Empirical Examination of Internal Relationships." *Community Development* 44(4):492–502. doi: 10.1080/15575330.2013.814698.
- Poot, J. 2000. "A Synthesis of Empirical Research on the Impact of Government on Long-Run Growth." *Growth and Change* 31(4):516–546. doi: 10.1111/0017-4815.00143.
- Rickman, D., and H. Wang. 2020. "U.S. State and Local Fiscal Policy and Economic Activity: Do We Know More Now?" *Journal of Economic Surveys* 34(2):424–465. doi: 10.1111/joes.12316.
- Rosen, H., and T. Gayer. 2013. *Public Finance*, 10th ed. New York, NY: McGraw-Hill Education.
- Saaty, T. L. 1990. "How to Make a Decision: The Analytical Hierarchy Process." *European Journal of Operational Research* 48(1):9–26. doi: 10.1016/0377-2217(90)90057-I.
- Saiz, M. 2001. "Using Program Attributes to Measure and Evaluate State Economic Development Strategies." *Economic Development Quarterly* 15(1):45–57. doi: 10.1177/089124240101500104.
- Salaghe, F., P. S. Watson, H. Hildebrandt, and M. Landis. 2020. "Business Climate in the Eye of the Employer." *Review of Regional Studies* 50(1):70–109. doi: 10.52324/001c.12256.
- Shaffer, R., S. Deller, and D. Marcouiller. 2004. *Community Economics: Linking Theory and Practice*, 2nd ed. Ames, IA: Wiley-Blackwell.

Table A1. Correlation among Asset Constraint Rankings, All Study Regions

	Battle Mtn, NV	Beaver, UT	Carbon, UT	Cibola, NM	Emery, UT	Escalante, UT	Grand, UT	Juab, UT	Kingman, AZ	Lewiston, UT	Millard, UT	Piute, UT	San Juan, UT	Sanpete, UT	Sevier, UT	Wayne, UT	Willcox, AZ
Beaver	0.610																
Carbon	0.158	0.672															
Cibola	0.441	0.909	0.639														
Emery	0.346	0.694	0.884	0.538													
Escalante	0.808	0.765	0.338	0.618	0.507												
Grand	0.725	0.705	0.172	0.525	0.284	0.820											
Juab	0.410	0.915	0.655	0.957	0.556	0.593	0.494										
Kingman	0.470	0.831	0.550	0.860	0.499	0.610	0.511	0.845									
Lewiston	0.290	0.870	0.686	0.820	0.672	0.490	0.445	0.882	0.717								
Millard	0.540	0.959	0.641	0.924	0.637	0.734	0.635	0.917	0.868	0.841							
Piute	0.732	0.889	0.550	0.820	0.608	0.814	0.651	0.820	0.744	0.744	0.833						
San Juan	0.846	0.725	0.312	0.594	0.374	0.868	0.854	0.550	0.578	0.437	0.624	0.840					
Sanpete	0.501	0.973	0.651	0.940	0.626	0.697	0.618	0.959	0.862	0.899	0.979	0.860	0.626				
Sevier	0.512	0.924	0.655	0.884	0.548	0.651	0.653	0.884	0.866	0.761	0.923	0.771	0.675	0.917			
Wayne	0.657	0.856	0.381	0.742	0.538	0.874	0.837	0.726	0.715	0.726	0.818	0.843	0.773	0.822	0.695		
Willcox	0.335	0.732	0.901	0.680	0.849	0.453	0.311	0.705	0.649	0.707	0.637	0.653	0.471	0.666	0.668	0.532	
White Pine	0.936	0.661	0.199	0.513	0.302	0.833	0.851	0.470	0.544	0.304	0.597	0.748	0.916	0.565	0.622	0.723	0.364