Model-Based Evaluation of Rural Development Policies

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In academic circles considerable effort has been devoted to constructing ex ante economic models for policy evaluation. For rural development policy a primary focus has been on the impact of public expenditure on economic growth, income and employment in rural areas. This article outlines the use of such models by focusing on a system used in the evaluation of rural development programmes in the United States and compares this with approaches used in the EU.

The use of model-based RD policy evaluation

Empirical models must mirror the specific characteristics of rural economies if they are to be appropriate analytical tools for evaluating rural development policy. These characteristics include the fact that rural economies are often dependent on relatively few sectors; the growing residential function of rural areas with not all rural residents contributing to the local labour force or spending all their income locally; and strong rural-urban interdependencies in many areas. Most research to date on the economy-wide impacts of rural development policies has been based on so-called Leontief models that focus on the economic interdependencies that exist in an economy. Leontief models can be based either on an input-output table (in which case the focus is on inter-industry linkages) or a social accounting matrix (SAM) (in which case the model will incorporate transactions between various types of economic actors such as firms, households, and governments). By allowing for the interdependencies that exist in an area, the benefits from a policy that increases activity (or vice versa) will multiply and spread beyond the sectors/households directly affected and into the wider economy.

Three positive attributes of Leontief models are their conceptual simplicity, the transparency of results, and their ability to reflect the unique economic structure of a region. A Leontief analysis of a particular rural development policy can capture differences in the magnitude of impacts between rural areas, and indicate which particular sectors and/or households are most affected. Moreover the results can be decomposed so as to identify the particular structural characteristics of the areas that are likely to influence the results.

At the same time, the standard Leontief model tends to over-estimate the consequences of economic stimuli. Leontief models make the assumption that there will be fixed proportional changes in output and input use, with a doubling of output, for example, leading to a doubling in the use of all inputs, including labour. Household consumption patterns are assumed fixed with, for example, a doubling of income resulting in a doubling of expenditure on all items. This latter assumption has been shown to disproportionately affect the magnitude of income and employment multipliers in rural economies due to their open structure. Consequently, it is generally...
recognised that such models have an inherent tendency to overestimate the effects arising from policies.

With adjustments to some of the basic assumptions, the Leontief model’s positive attributes can be exploited while avoiding the tendency to overestimate economic impacts. One of the most sophisticated applications of this framework in the context of the evaluation of rural development policy is the Socio-Economic Benefit Assessment System (SEBAS) used in the United States.

The genesis of SEBAS

The rural development mission statement of the US Department of Agriculture (USDA) is ‘[t]o increase economic opportunity and improve the quality of life for all rural Americans.’ Historically, the pursuit of this mission has been closely aligned with supplying infrastructure such as water systems, electrification and most recently broadband to rural areas. Evaluation requires, first and foremost, determining whether government programmes have remedied an infrastructural deficiency. In contrast, initiatives designed to increase economic opportunity – the principle objective of USDA Rural Development business programmes that utilise guaranteed loans and grants – pose a more daunting evaluation challenge. Since there are many factors that influence employment, wages or income; demonstrating the government contribution is rarely straightforward.

A Congressional inquiry and government audit of USDA Rural Development business programmes demonstrated that estimating impacts had to go beyond merely counting direct jobs created to address the primary programme goal: to ‘fund projects that create or preserve quality jobs ... promoting a dynamic business environment in rural America.’ The evaluation challenge became standardised across all government agencies with the adoption of the Program Assessment Rating Tool (PART) administered by the Office of Management and Budget (OMB) in 2003. PART requires that agencies respond to 25 questions about management and effectiveness. Responses do not require external assessment, but the quality of the evidence provided is weighed in the overall assessment of programme effectiveness.

Les modèles devraient faire partie intégrante de l’évaluation plus générale de la politique de développement rural.

The combination of the Congressional inquiry, government audit and new OMB criteria provided the impetus to develop a monitoring and evaluation system for USDA Rural Development business programmes. SEBAS was developed for USDA by the Rural Policy Research Institute at the University of Missouri to address the need for an evaluation method of sufficient scope and quality for rural business programmes.

The components of SEBAS

SEBAS is a comprehensive information system comprising:

1. A set of benefit indicators;
2. Data needs and data collection procedures; and
3. A SAM-based model to calculate and predict indicator values for programmes and projects.

Benefit indicators

Estimates of ‘direct’ jobs created or retained are used by many federal and state agencies as a measure of the performance of government programmes. However, the number of direct jobs is, in isolation, a poor indicator of economic change and performance. For example, part-time and full-time jobs are treated equally despite the fact that full-time jobs typically generate more income and employee benefits. Job estimates should be adjusted to reflect full-time equivalency (FTE). This provides a performance measure that includes seasonal and part-time work but weights these less than full-time, year-round jobs.

Measuring the ‘quality’ of jobs is critical. Employers that pay higher wages, more benefits, and contribute to the tax base, and those that indirectly stimulate the activity of existing firms with these attributes will contribute more to local, rural community welfare. This factor can be measured by the ratio of GDP to FTE or the ‘GDP per worker’ ratio. The system must have a way to account for the indirect changes in GDP and employment beyond those generated by programme beneficiaries.

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Changes in one sector have important impacts on other sectors through economic linkages. Business owners know that their activity fluctuates in response to changes in the economic situation of their customers. There is no question as to the existence of economic multipliers from this relationship. However, legitimate questions arise as to the size of those multipliers and whether there are offsetting or partially offsetting effects elsewhere in the economy.

Of particular concern in the small, open economies that characterise rural areas is the issue of job displacement. When labour and capital are induced to relocate there is spatial displacement, but from the perspective of the local economy these are new jobs and new investment. If displacement is local, as is often the case when new activities primarily serve the local market, typical measures of change in jobs, income and GDP, both direct and indirect, overestimate the local impact. In such cases, accurate measures of benefits require an adjustment for the displacement effect. SEBAS attempts to do this in order to provide a more accurate assessment of the net impact of RD programmes.

In the long run, in a closed economy, with a given labour force at full employment, the only source of economic growth is productivity growth. Of course, no economy (except for the global economy) is closed. Given immigration and international financial markets, sound economic development policies can lead to net gains in jobs at the national level over time. But the impacts are relatively small in comparison to overall job replacement rates. The most important determinant of growth, especially on a per capita basis, is still productivity growth. Thus job displacement when new jobs are created is not only likely, but also desirable.

This suggests the following principles for measuring success in creating economic opportunity in rural areas:

1. The ideal proxy for economic benefits (given accuracy of estimates, costs of data collection and costs of calculation) is contribution to Gross Domestic Product;
2. The total impact, including leveraged investments, the multiplier effect and forward linkages are relevant;
3. Local displacement effects should be estimated and used to adjust estimates of impact;
4. Relocation of economic activity from non-targeted to targeted places is consistent with the rural development mission;
5. Programmes which create higher productivity activities are preferred, hence total GDP per job created should be included as an indicator; and
6. The programme should be credited with any impacts that would not have occurred without the intervention.
SEBAS offers an opportunity to consider a wide and rich array of possible assessment criteria that can be measured at the county, regional and state level. The array is ‘wide’ because SEBAS tracks a greater number of possible assessment criteria than just the number of jobs created or retained. The array is ‘rich’ for two important reasons. First, SEBAS not only considers the direct effects of a programme, but also addresses its indirect effects. Second, SEBAS provides an evaluation of the geographic dispersion of social and economic effects by measuring impacts at the county, region and state levels.

The quantitative measures used to evaluate programme performance comprise:

1. Direct jobs;
2. Direct full-time equivalent (FTE) employment;
3. Adjusted FTE equivalent employment;
4. Total adjusted FTE employment;
5. Total adjusted gross domestic product;
6. Total adjusted gross domestic product per adjusted FTE.

**Data**

Sound data are the key to sound assessment. The SEBAS system was designed to maximise the quality and quantity of data generated for this process while minimising the total amount of data collected, the demands upon programme beneficiaries, and the effort of agency personnel. The SEBAS system incorporates a large amount of secondary data, but primary data are still central to assessment.

Since the benefit indicators are based on total value-added (i.e. contribution to GDP), and quality of net jobs created, it is important to know each project’s linkages with the local economy and the types of jobs generated. The SEBAS model has been constructed to measure direct and indirect jobs by occupation, and direct and indirect value-added (GDP). It also contains base information on economic interactions which are based on average national technologies and local trade flows.

While primary data collection is highly desirable, the least invasive alternative for generating ex post data is to base assessment on such base data. Nevertheless it is necessary to confirm the continued operation of economic activities as well as some indication of the actual size of operations, either through employment or firm revenues.

**The SEBAS model**

The essential features of the SEBAS model are as follows:

1. 54 producing sectors, 9 household income-classes, 10 occupational groups, 9 federal tax revenue categories, and 16 state and local tax revenue categories.
2. One model for each county or equivalent entity (3,140 in total).
3. Multiregional Social Accounting Matrix (SAM) – county, rest of non-metropolitan area and rest of state. SEBAS is built on an interregional SAM which incorporates trade flow data to estimate the location of impact (and displacement) of economic initiatives. These trade flow data have not been used in previous SAMs. Data are obtained from a variety of places, but most are from IMPLAN (Impact analysis for Planning) originally developed by the US Forest Service. Use of an interregional SAM permits the evaluation of economic benefits in the county in which a programme is located, the non-metropolitan portion of the state, and the state as a whole. This geographical configuration was identified as the most relevant for the users of the information from the model.

SEBAS uses a new method for estimating the likely displacement effects of creating new economic activities in competitive sectors at near full employment. The approach assumes, for example, that a new firm in a sector in which there are no local competitors will create no local displacement of jobs. On the other hand...
hand the creation of a new firm in a market which is already meeting local needs from local firms will create no net new employment in the area. Only if it exports some of its production, or is more efficient or productive than existing firms will it have a net new effect on the local economy.

SEBAS is currently housed on the USDA internal computer network. It has been in use by USDA RD state offices and in Washington, DC since October 2007. The SEBAS system covers all 50 states plus Puerto Rico and US territories. The system is currently configured to evaluate three RD programmes – Business and Industry Loans and Grants, Intermediary Relending Program, and the Rural Energy for America Program.

Going forward, the interest is to include more USDA programmes such as community facilities, housing and utilities, and to expand the number of assessment indicators to capture more fully the social impacts of programmes, and to begin to address environmental sustainability.

The future for model-based analysis of rural development policy – an EU perspective

In contrast to the United States, a major constraint facing EU modellers working on rural development policy is the lack of data at the sub-national level. It is generally accepted that the impact of RD policies will be territorially distinct, and thus most ex ante modelling in the EU, as in the US, is focused on the sub-national or regional level. However there is no EU equivalent to the IMPLAN database. This has, to date, undoubtedly affected both the number of case-study-specific modelling applications and the development of pan-EU models for assessing RD policies similar to SEBAS in the US.

There are other fundamental issues facing EU rural development modellers. Unlike in the United States, many EU rural development policies are explicitly based on the idea that environmental quality, culture, human and social capital are important drivers for economic growth in rural areas. However, such public good aspects are rarely incorporated explicitly into existing models. Another issue is the static nature of most modelling approaches: by failing to allow for the effects of investment, technical change and research and development, it is difficult to analyse EU policies that focus on enhancing the long-run growth potential of rural areas.

“Modelling should be a key element in the broader evaluation of rural development policy.”

As reflected by specific amendments made to the SEBAS model, the assumptions embedded in Leontief models are strong and, arguably, unrealistic, particularly in the case of small rural economies.

The majority of the research effort within the EU (much of it funded by the European Commission) is focusing on alternative modelling frameworks. Developments are ongoing in several areas (including growth models, New Economic Geography (NEG) models, and macroeconomic models for regional analysis) but Computable General Equilibrium (CGE) models have become the dominant approach for the analysis of economy-wide impact of policies. CGE models are built on Social Accounting Matrices (SAMs) and share many characteristics with the Leontief models discussed above but they incorporate supply and demand elasticities consistent with standard microeconomic principles. As a result, they are generally thought to provide a more realistic picture of the
way that economies function in response to policy changes. Thus, for example, they are capable of reflecting changes in the structure of production (composition of inputs in generating a particular output) and changes in consumption patterns (in response to prices). Moreover, CGE modellers are more fortunate than Leontief modellers in that they are able to test the robustness of their results to some (but not all) of the key assumptions embedded in their models. Results from CGE analyses generally show smaller policy impacts than Leontief models due to the adjustments that producers and consumers make to their behaviour. Results from CGE models have also highlighted that sector-specific policies are not always unambiguously positive: some producers and/or households may be worse off as a result of policy intervention.

On the basis of analysis conducted thus far, some important findings have emerged from empirical studies of EU rural development policies. A clear finding is that the effects of the CAP RD policies are region specific. This supports the increasing flexibility given to EU Member States in relation to choosing, financing and implementing RD policies. The increasing emphasis being given to rural development policies within the CAP suggests that there is a need for further research effort in this area and strong arguments that modelling should be a key element in the broader evaluation of rural development policy in the EU.

Further Reading

- United States Department of Agriculture, Rural Development. Website: http://www.rurdev.usda.gov/

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Model-Based Evaluation of Rural Development Policies

A primary concern in rural development policy is the impact of government expenditures on economic growth, income and employment. The Socio-Economic Benefit Assessment System (SEBAS) model developed through academic/government collaboration in the United States is an example of a practical tool for assessing the impact of federal programmes on these key development indicators. The model is based on an interregional social accounting matrix (SAM) and estimates the location and impact (including displacement effects) of economic initiatives. It has been used to examine the impact of loans and grants programmes and rural energy projects on regional value-added (GDP) and the quantity and quality of employment. Although the challenges of using model-based assessment are greater in the European Union due to data deficiencies and a complex rural development policy framework, considerable potential exists for deepening understanding of the effectiveness of policy measures, particularly in terms of region-specific impacts. Results obtained through modelling approaches such as computable general equilibrium (CGE) models, suggest that the impacts of programmes can be smaller than traditionally assumed and that there can also be important redistribution effects. There are strong arguments for making modelling a key element in a broad evaluation of rural development policy.

L’évaluation de la politique de développement rural à partir de modèles

Une préoccupation essentielle de la politique de développement rural est l’incidence des dépenses publiques sur la croissance économique, les revenus et l’emploi. Le modèle du Système d’évaluation des avantages socio-économiques (SEBAS), développé aux États-Unis dans le cadre d’une collaboration entre universitaires et pouvoirs publics, est un exemple d’outil pratique permettant d’évaluer l’incidence des programmes fédéraux sur les indicateurs-clé du développement. Le modèle se fonde sur une matrice de comptabilité sociale (MCS) interrégionale et estime la localisation et l’impact (y compris les effets de déplacement) des programmes économiques. Il a été employé pour examiner les incidences de programmes de prêts et de dons en capital, ainsi que de projets ruraux de production d’énergie, sur la valeur ajoutée régionale (PIB) et sur l’emploi en termes quantitatifs et qualitatifs. Si les difficultés que présente une évaluation à partir d’un modèle sont plus importantes dans l’Union européenne du fait du manque de données et de la complexité du cadre de la politique de développement rural, il existe un potentiel considérable d’approfondissement de la compréhension de l’efficacité des mesures gouvernementales, en particulier en ce qui concerne les incidences au niveau régional. Les résultats tirés de modèles comme les modèles d’équilibre général calculables, suggèrent que les incidences des programmes peuvent être moindres que celles traditionnellement considérées et qu’il peut également se produire des effets de redistribution importants. Il existe des arguments solides pour placer la modélisation au sein d’une évaluation à grande portée de la politique de développement rural.

Modellgestützte Evaluation von Politikmaßnahmen zur Entwicklung des ländlichen Raums

Im Zentrum des Interesses der Politik zur Entwicklung des ländlichen Raums stehen u.a. die Auswirkungen der Staatsausgaben für wirtschaftliches Wachstum, Einkommen und Beschäftigung. Das SEBAS-Modell (Socio-Economic Benefit Assessment System) entstand in den USA durch wissenschaftlich-staatliche Zusammenarbeit und stellt ein praktisches Beispiel zur Bewertung der Auswirkungen öffentlicher Programme auf diese zentralen Entwicklungsinanziator dar. Das Modell stützt sich auf eine überregionale Gesamtrechnungsmatrix (Social Accounting Matrix, SAM) und quantifiziert den Ort und die Wirkung (einschließlich Verdrängungseffekte) wirtschaftlicher Aktivitäten. Das Modell wurde eingesetzt, um die Auswirkungen von Kredit-/Zuschussprogrammen und von Energieprojekten im ländlichen Raum auf die regionale Wertschöpfung (BIP) und die Beschäftigung sowie deren Qualität zu untersuchen. Obwohl die Herausforderungen bei Verwendung einer modellgestützten Bewertung in der Europäischen Union größer sind, weil es an Daten fehlt und die politischen Rahmen zur Entwicklung des ländlichen Raums komplexer ist, so birgt diese Vorgehensweise ebenfalls großes Potenzial, die Wirkungsweise von Politikmaßnahmen, insbesondere deren regionalspezifischen Auswirkungen, besser verstehen zu können. Die Anhand von Modellansätzen wie z.B. einem Allgemeinen Gleichgewichtsmodell (Computable General Equilibrium Model, CGE Modell) erzielten Ergebnisse deuten darauf hin, dass die Auswirkungen der Programme geringer sein können als üblicherweise angenommen, und dass zudem bedeutende Umverteilungseffekte hervorgerufen werden können. Viele gute Gründe sprechen dafür, modellgestützte Ansätze als zentrales Element in die umfassende Evaluation der Politik zur Entwicklung des ländlichen Raums zu integrieren.