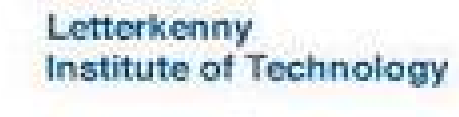
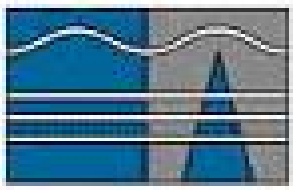
A Social Accounting Matrix Project

for

the Border, Midland and Western (BMW) Region of Ireland

A Project Partnership of





Acknowledgements

As project manager for this Social Accounting Matrix project for the Border, Midland and Western region of Ireland I would like to acknowledge the work of the BMW assembly led by Gerry Finn in their continued support for this project, especially, their facilitation during the ongoing dissemination process. I would like to thank Joe Tracey, Bill Keating and all the statisticians from the CSO, in both Cork and Dublin, who provided so much in terms of providing access to data as well as their knowledge and experience concerning survey methodology and data conventions. Naturally I am particularly grateful for the manner in which they facilitated Matt Fannin during his placement with them.

I would like acknowledge the work of Prof. Tom Johnson of the University of Missouri and Dr. Matt Fannin, Louisiana State University, for their contribution to the development of a skills base in Ireland, the construction of our regional model, the Western Rail Corridor Scenario and their continued work in dissemination. We also would like to thank Prof. Michael Keane from NUI Galway for leading the best practice review stage and his role in the validation process and his work on dissemination with regards to evidence based policy.

I would like to thank John Andy Bonar, Paul McCusker, and Simon Stephens from the Letterkenny Institute of Technology (LYIT). John Andy's efforts to bring together partners and provide administrative and logistical support. Simon and Paul's efforts in local government data collection and analysis as well as project maintenance and dissemination are greatly appreciated. Without these partners, we would not have been able to successfully complete this project.

Jack O'Herlihy
Head of Development LYIT

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EXECUTIVE SUMMARY

This report outlines the work of the Border Midland and Western (BMW) Region Social Accounting Matrix (SAM) project for the period July 2002 to September 2004. The specific target of the SAM project was to develop a regional policy analysis tool, which could deliver "on the ground" capacity for decision makers and stakeholders within the BMW region.

The leadership of the Border-Midland-Western (BMW) Region of Ireland faces many complicated policy choices as it endeavors to stimulate sustainable economic development. A regional policy analysis framework is needed to compare the benefits, costs and impacts of alternative regional policies and to show how specific measures work in the region. The SAM project has constructed a model for the BMW region, tested, and applied it to an economic, issue facing the BMW leadership.

The completed SAM affords the following benefits to the BMW region:

- The capacity to analyse the impact of structural funds at a regional and county level and improve the management of the structural funds. Information is the key to effective decision making and the SAM will allow decision makers to perform 'what-if' analysis on various scenarios.

- An additional information and analytical tool which is easily accessed by stakeholders in the decision making process. There is a need for a comprehensive evaluation strategy in the region and the availability of tools such as the SAM will enhance this strategy.

- Act as a platform for the transfer of know how and best practice: The degree of cooperation and interchange between the partners involved in the construction and use of the SAMs will act as a stimulus for research and discussion.

The range of activities undertaken during the course of the project are outlined in this report. All the major outputs to date are available in the appendixes and a detailed financial statement will be submitted by end of October 2004.

In addition to the development of the economic model for the BMW Region and the construction of a scenario building exercise to test the model the other key outcome of the project was to be the development of increased academic cooperation between Letterkenny Institute of Technology and University of Missouri to ensure ongoing technical transfer would be taken to increase capacity within the region to undertake future analysis.

SECTION 1: BACKGROUND TO THE PROJECT

The specific target of the SAM project was to develop a regional policy analysis tool, which could deliver "on the ground" capacity to aid decision makers and stakeholders within the BMW region.

The leadership of the newly created Border-Midland-Western (BMW) Region of Ireland faces many complicated policy choices as it endeavors to stimulate sustainable economic development. A regional policy analysis framework is needed to compare the benefits, costs and impacts of alternative regional policies and to show how specific measures work in the region. The "**Show Me**"[1] project had previously demonstrated, on a pilot scale, the power of Social Accounting Matrices (SAM) in regional economic policy analysis. The SAM project proposed that a SAM be constructed for the BMW region, tested, and applied to economic, fiscal, social and environmental impact issues facing the BMW leadership. Researchers at the National University of Ireland, Galway together with the Letterkenny Institute of Technology and the University of Missouri Columbia were chosen to construct the SAM collaboratively. The University of Missouri and Letterkenny Institute of Technology proposed the establishment of a joint unit on the LYIT campus to work closely with NUI, Galway throughout the project

SAMs describe the many economic flows among sectors of a regional economy, and between the region and the rest of the world. Changes in activity in one sector, say tourism, are traced through all other sectors, including the public sectors, to calculate total sectoral income, employment, tax revenues, and trade. As the Show Me project demonstrated that the framework of the SAM can be customized to reflect regionally important sectors and specific policy applications. For example, a 2-region SAM can be used to examine the relationship between the BMW region and the rest of the economy. This can be an important tool in assessing the impacts of regionalisation on output and growth for the country as a whole.

Unlike the Show Me project it was envisaged that the BMW SAM would be constructed from secondary data. The model would be consistent with the EU's standard rectangular national

[1] A project that developed a primary data SAM for Co. Fermanagh and the Donegal Gaeltacht.

income accounting system. Primary data would be collected if necessary to allow the analysis of policy scenarios. For example, if the SAM were to be used to analyse a specific tourism development program, primary data would be collected on the tourism sector and introduced to the SAM.

It was proposed that the SAM would first focus on the economic and fiscal linkages. Because the SAM will frequently be used to analyse the impacts of EU structural funds and other fiscal policies there was a need for intergovernmental fiscal aspects of the model to be emphasized. It is hoped that once the basic SAM is complete, other capabilities including environmental and social impacts will be added.

The completed SAM affords the following benefits to the BMW region:

- The capacity to analyse the impact of structural funds at a regional and county level and improve the management of the structural funds. Information is the key to effective decision making and the SAM will allow decision makers to perform 'what-if' analysis on various scenarios, gain a greater understanding of the dynamics of specific key sectors of the BMW regional economy and develop cost benefit matrices of different investment strategies within the BMW region.

- An additional information and analytical tool which is easily accessed by stakeholders in the decision making process: The challenges and objectives for the BMW region as set out in the operational programme for the BMW region 2000 – 2006 will require a comprehensive evaluation strategy and the availability of tools such as the SAM can only enhance this strategy.

- Act as a platform for the transfer of know how and best practice: The degree of cooperation and interchange between the partners involved in the construction and use of the SAMs will act as a stimulus for research and discussion. It is the intention of the development team to actively publicise the results of their work through working papers and non-technical reports.

It was proposed that the SAM would be constructed so that it could easily be used, updated, and added to by BMW Regional Assembly policy analysts. Members of the research team from NUI, Galway and LYIT were requested to offer advice to policy analysts in the use and interpretation of the SAM.

It was the aspiration of the SAM project leaders that based on the experience of the Show Me project, a secondary data SAM for the BMW region, linked to the rest of the Republic could be completed and tested within the lifetime of the project.

SECTION 2: WORK PACKAGE TIMELINE

2.1 WORK PACKAGE 1: AGREE A METHODOLOGY.

A key aspect of this project was to facilitate technology transfer between all the members of the project group. The cornerstone of this process was the agreement by the Missouri based partners to actively pursue a programme of education and training. The project partners, namely LYIT and NUI Galway, set as a key objective the creation of localised capacity to generate and sustain econometric models in the medium to long term, which are consistent with international best practice and conform to regulations as set out by the European Union.

The methodology being used by the project is compatible with guidelines issued by Eurostat, namely, European System of Accounts (ESA 95). This approach is also consistent with policies currently being adopted by the CSO. A major review of all the published IO tables within the EU was undertaken and this will act to ensure that the BMW SAM reflects best practice from the other EU regions.

2.2 WORK PACKAGE 2: IDENTIFY ALL DATA REQUIREMENTS.

Through a process of dialogue between the project team and Professor Tom Johnston research was undertaken to pinpoint all possible data needs and their potential sources. The following sources were identified in the first instance:

Datasets Requests by CSO Publication Source
Unpublished 1997 Manufacturing Inputs and Commodities Survey
Census of Agriculture
Regional Accounts from Agriculture
Census of Construction
Industrial Employment (5 years)
Industrial Earnings (5 years)
Census of Industrial Production (5 years)
PRODCOM
County Incomes and Regional GDP (5 years)
Household Budget Survey

Census of Population
National Income and Expenditure (10 years)

This list comprises all the datasets that were necessary to construct the SAM. One major limitation identified in completion of work package one was the availability of data at appropriate level of detail. The primary deliverable of this work package was an agreed list of data requirements. This list was sub-divided into three main categories essential, non-essential and desirable. A second issue to be resolved was agreement on the scope of the data collection and the level of regionalization required.

2.3 WORK PACKAGE 3: IDENTIFY ALL ACCESSIBLE SOURCES OF DATA.

The project management team engaged with the CSO with a view to gaining access to the datasets identified during work package two. It was recognised that the degree of access afforded to the project by the CSO was of crucial importance in that it would determine reliability of the model. The CSO agreed in principle to allow controlled access to all their datasets and to appoint a member of the project team as an officer of statistics at the CSO office in Cork. The following datasets became available to the project team:

National Income and Expenditure Tables
County Incomes and Regional GDP
Census of Agriculture and Regional Agricultural Accounts
Census of Industrial Production and PRODCOM
Census of Building and Construction
Annual Services Inquiry
Household Budget Survey
Quarterly National Household Survey

Throughout the project, the confidentiality and institutional requirements of the CSO have been strictly adhered to.

2.4 WORK PACKAGE 4: DETERMINE THE AREAS WITHIN THE REGIONAL ECONOMY OF SPECIFIC INTEREST.

During a one day seminar on regional statistics hosted by the Central Statistics office in Cork, a technical annex was adopted. This essentially defined the statistical conventions which were to be applied by project group. The basis for this annex was the Eurostats ESA 95 manual on Input-Output: Valuation matrices in conjunction with Handbook on Social Accounting Matrices and Labour accounts produced by the European Commission.

The 1995 ESA distinguishes two main valuation concepts of the flows of goods and services: purchaser's prices and basic prices which formed the basis for the production of this Social accounting matrix.

For input-output analytical purposes a valuation as homogeneous as possible is required as the input-output relations measured in monetary units are interpreted as technical relations. A unit of a specific input product should represent the same physical quantity in whatever production process it is used. Thus, a valuation at purchaser's prices is a less homogeneous option as the shares of trade and transport margin differ from industry to industry and also from and between the final uses; the same is true for the shares of product taxes less subsidies. A valuation at producer prices is obviously more homogeneous as the different shares of trade and transport margins are eliminated. In the same way a valuation at basic prices is even more homogeneous as also the different shares of product taxes less subsidies are eliminated. Thus, basic prices are the preferable valuation concept in the supply and use framework and it s also the valuation concept that in practice can be achieved.

2.5 WORK PACKAGE 5: COLLECT DATA.

The time between April 21 and May 13 was spent identifying datasets to be used in SAM model construction based on preliminary evaluation of published data a priori. Members of the project team met with statisticians directing each of the business and household surveys to identify the sampling procedures used to collect the datasets as well as the assumptions made to impute any regional data. Variable definitions were further evaluated against ESA 95 data definitions for SAMs. Procedures were identified to harmonize survey data with SAM data requirements.

2.6 WORK PACKAGE 6: SYNCHRONISE DATA

The time spent between May 14 and July 1 was spent in parsing data for the SAM model. A critical element of the overall process was to ensure harmonization of survey sectors from the various business and household surveys into the NACE sectoral classification outlined in ESA 1995. This involved collecting administrative data from local government in order to incorporate these data into the SAM model. Concordance tables were constructed and combined with the survey specific sectors to transform survey data into SAM specific sectors. At all times the confidentiality of the data sets was respected.

The next step was to combine aggregate totals from non-surveyed business sectors with structural coefficients from similar EU member states to estimate detailed consumptions coefficients based on strategies provided by the EU Handbook on Social Accounting Matrices and Labour Accounts. Finally additional concordance tables were created to estimate transportation and trade margins for business sectors of the economy according the article of Rainer (2000).

2.7 WORK PACKAGE 7: CONSTRUCT PRELIMINARY MODEL.

Between June 23 and July 1, the detailed data produced at this point were aggregated to single industry-wide and household-wide totals. These totals were compared to and adjusted to fit with Regional Account Aggregates provided by National Accounts. An aggregated SAM model was presented at Ballaghaderreen on July 1.

2.8 WORK PACKAGE 8: BALANCING AND DERIVATION OF MULTIPLIERS.

Following the initial construction Matt and Tom worked on completing a balanced thirty six sector SAM. Due to the many alternative data sources used from different government agencies as well as conventions applied, row and columns are rarely equal after initial construction. Hence, an approach must be chosen that assists the modeler in the balancing of row and column totals. The approach chosen for balancing the SAM is known as the RAS method[2].

The industry and commodity multipliers are constructed based on matrix multiplication and inversion of the Supply and Use Matrix. First, a coefficient form of the Use Matrix, B, is

[2] The RAS method is a bi-proportional adjustment method whereby row and column elements are adjusted in order for their row and column totals to equate (Miller and Blair, Isard et al. 1985).

calculated by dividing each commodity row element in the Use Matrix by its column industry total. Second, a coefficient form of the Supply Matrix, C, is calculated by dividing each commodity column element by its industry row total as per Miller & Blair 1985[3].

2.9 WORK PACKAGE 9: TEST MODEL.

This process of validation was undertaken by Prof. Michael Keane at NUI Galway and the CSO, although time consuming this work gives the model essential creditability. The process involved the checking of:

- The assumptions and procedures used.
- The adherence to EuroStat guidelines.
- The adherence to CSO rules on publication of national data
- The validity of final outputs from the model.

2.10 WORK PACKAGE 10: CREATE BMW SPECIFIC SCENARIOS

Following much discussion between the project partners it was decided to run a scenario based on the impact of the Western Rail Corridor on the BMW regional economy. The scenario undertaken by Tom Johnson would aim to capture the effect on tourism of this new infrastructure. The results of this scenario are presented later in the document.

[3] The completed SAM template and series of multipliers are available in appendix 1.

SECTION 3: PROFILES OF MAIN PARTNERS

MR. JACK O'HERLIHY (LETTERKENNY INSTITUTE OF TECHNOLOGY)

Mr Jack O'Herlihy is the Head of development at Letterkenny Institute of Technology. In this role he has been responsible for the rapid expansion of a range of services including: (1) Services to local Industry, including training and internships. (2) A continued education and life long learning programme. (3) Development of the internationalisation of the college through foreign partnerships and exchange programmes. He is currently in charge of the Business Development centre on the campus, which provides state-of-the-art IT infrastructure and aims to develop the ICT/IT industry in the region.

As manager of the project he had responsibility for ensuring all agreed targets were met. He has special responsibility within the project group for dealing with State Agencies, for ensuring technology transfer from the US partners and for laying the foundations of ongoing academic and programme cooperation.

PROF MICHAEL KEANE (NUI GALWAY)

Professor Michael Keane received his undergraduate degree from the National University of Ireland, Galway and completed his postgraduate work at Simon Fraser University, Canada.

His main research interests are in spatial economics, regional and local development, and tourism economics.

Professor Keane's recent research work has included papers on spatial models of job search, and a paper on the interface between theory and practice in rural and local development in Ireland, published in Regional Studies. His work on models of competition between urban places has appeared in The Journal of Regional Science and in Regional Studies. Economic models of tourism quality and tourism sustainability have appeared in The Annals of Tourism Research and in Applied Economics. Professor Keane was joint editor, (with Dr. Eamon O'Shea) of Core Issues in European Integration, Dublin: Oak Tree Press, 1999. Professor Keane is a member of the Regional Science Association and Resource Editor for The Annals of Tourism Research.

During the initial stage of the project Prof. Keane led the task of learning and developing a system of best practice. He also worked to identify the sources of data and highlighted possible problem areas. In the second phase his work focused on validating the SAM model. His paper on regional policy evaluation and appraisal presented at the SAM seminar in 2004 is available in appendix 2.

PROF. TOM JOHNSON (UNIVERSITY OF MISSOURI)

Prof. Tom Johnson is the Frank Miller Professor of Agricultural Economics and The Director of the Community Policy Analysis Center at the University of Missouri.

He has been at the University of Missouri--Columbia since January 1997. Prior to this he was on the faculty of Virginia Tech for 15 years and the University of Saskatchewan for 3 years.

In addition to teaching and research, He directs a university center called the Community Policy Analysis Centre (CPAC). CPAC includes six permanent staff, 2 or 3 part time associates, and usually about 12 graduate and undergraduate students. They conduct research and outreach programs focused on the economic and social decision-making in small communities. They have projects in several communities in Missouri as well as communities in Ireland.

Professor Tom Johnson has provided the SAM project with expertise in regard to the construction of SAM models. He has provided a knowledge transfer which has allowed the SAM to be built and a scenario to be created..

DR. MATT FANNIN (LOUISIANA STATE UNIVERSITY)

Dr. Matt Fannin has completed a Ph.D. at the Department of Agricultural Economics University of Missouri Columbia. He is currently employed at Louisiana State University. Matt's role in the project was to lead the construction work on the SAM during the course of his work Matt worked within the CSO as an officer of statistics. Matt presented the final version of the Sam at a seminar at LYIT on September 6th 2004.

MR. SIMON STEPHENS (LETTERKENNY INSTITUTE OF TECHNOLOGY)

Simon was employed as a research assistant to Prof. Michael Keane for the lifetime of the project. He undertook a review of best practice in Europe which resulted in a paper on comparative approaches to regional modelling. He worked on data collection specifically the local authority datasets. He also created bridging tables to convert the CSO classification system to NACE. During the period since the construction of the Input-output tables he has presented the completed model and initial findings.

MR. PAUL MCCUSKER (LETTERKENNY INSTITUTE OF TECHNOLOGY)

Paul is a lecturer in the Business Studies Department and was employed as a research assistant on the project. He was involved in the initial period to identify data sources and the collection of local authority data. He also worked on building the bridging tables which allowed the SAM to be created using NACE Rev 1. He was involved in the initial dissemination process giving presentations on the construction techniques and methodology being used.

MR. JOHN ANDY BONAR (LETTERKENNY INSTITUTE OF TECHNOLOGY)

Mr. John Andy Bonar is the Head of School of Business Studies at Letterkenny Institute of Technology. John Andy assisted Jack O'Herlihy in the management of the project. His main role was that of supervisor of the project workers and meeting with State Agencies.

SECTION 4: REVIEW OF ACTIVITY:

OCTOBER 2002

Date: 3-4 October 2002

Location: Letterkenny Institute of Technology

Attendees: Mr. Jack O'Herlihy (LYIT)
Mr. John Andy Bonar (LYIT)
Prof. Tom Johnson (University of Missouri)
Mr Padraig Gallagher (LYIT)
Mr Simon Stephens (NUI Galway)
Prof Michael Keane (NUI Galway)
Mr Paul McCusker (LYIT)

The seminar was broken into three sessions. The first looked at how a methodology could be developed. It was felt that a final decision could not be reached until the availability of data was finalised. This resulted in the decision to open negotiations with The Central Statistics office (CSO) about the possibility of access to their vast data resources.

The second session was led by Professor Tom Johnson who provided a lecture on

1. Social Accounting concepts
2. Input output identities
3. Multiregional Input-Output
4. Applications of Input-Output Analysis.

This session provided all involved with the project an excellent opportunity to learn and discuss all aspects of Social Accounting.

Session three provided the group with a short overview of the Show me project which built SAM models for the Fermanagh and Gaeltacht area of Donegal. This session provided the group with an insight into how data can be collected for theses models and also how they can be used to develop "macro tables". The meeting concluded with the agreement that all attentions should be focused on contacting and meeting the CSO.

DECEMBER 2002

Date: 3 December 2002

Location: BMW Assembly, Ballaghaderreen, Co Roscommon

Attendees: Mr. Jack O'Herlihy (LYIT)
Prof Michael Keane (NUIG)
Mr Paul McCusker (LYIT)
Mr Gerry Finn (BMW)
Mr Kieran Moylan (BMW)
Mr Michael O'Brien (BMW)
Ms. Louise Kinlen (BMW)

The meeting began with an update on progress on the SAM project. Prof. Michael Keane began by providing an account of the exploratory work undertaken by him and Mr Simon Stephens at NUI Galway. The work was of a learning nature and had looked at European examples and the task of constructing a SAM in the context of the BMW region.

This was followed by an explanation of the problems faced at the level of the CSO. Negotiations which were led by Mr. Jack O'Herlihy had discovered that at this point the CSO was not in a position to provide the project with the necessary national supply and use tables or the input-output tables that were necessary to initiate the construction of the SAM.

It was accepted by all present that the long term value and effectiveness of the SAM project was contingent upon accessing all relevant data from the CSO. It was agreed that the BMW executive would communicate with CSO with a view to expediting the data collection process and agreeing effective modes of working with the SAM project team.

JANUARY 2003

Date: 8 January 2003

Location: BMW Assembly, Ballaghaderreen, Co Roscommon

Mr. Paul McCusker gave a presentation to the BMW regional executive. This presentation was in three parts:

1. An overview of the project
2. The work completed to date and
3. A proposed work plan up until April 2004.

Paul emphasises that the overall project objective was:

> *"To provide a policy analysis tool which will increase the capacity of the BMW to conduct research and analysis in order to make better informed decisions at a regional level".*

The **main steps** in creating a SAM were outlined:

1. Agree a methodology.
2. Identify data requirements and possible sources.
3. Collect data and undertake any modifications/analysis.
4. Construct a preliminary model.
5. Balancing and derivation multipliers.
6. Test the model.
7. Create a BMW specific scenario.

It was explained that work to date had led to an agreed methodology, one which was compatible with guidelines issued by Eurostat: A review of published European IO tables had been undertaken so that in conjunction with the project partners at the University of Missouri a policy of best practice could be established. Within the constraints of accessibility work had been completed in identifying data sources and in cases where this was not possible these matters were brought up during ongoing negotiations with the CSO. In the short term the project would continue with negotiation with the CSO and prepare a three person delegation which would travel to the University of Missouri for training under the guidance of Professor Tom Johnson.

FEBRUARY 2003

Date: 10-19 February 2003

Location: University of Missouri (Columbia)

As part of the work plan in February a delegation from Ireland travelled to the University of Missouri (Columbia). Ms. Louise Kinlen (BMW), Paul McCusker (LYIT) and Mr Simon Stephens (NUIG) formed the group. The purpose of the trip was twofold. The group met with Prof Tom Johnson and Mr. Matt Fannin who provided practical training in the area of SAMs and also entered into discussion about how the project could move forward.

During their time in Missouri the delegation participated in classes with Matt Fannin where Matt gave an introduction to Irish SAMs and to scenario construction. The group also got the opportunity to enter classes given by Prof. Tom Johnson on social accounting and input-output identifies.

During the stay in Missouri the group undertook two essential tasks. Firstly a brainstorming session was held in order to develop SAM scenarios for the BMW region. Five potential areas of interest were picked as follows:

1. Infrastructure investment.
2. The impact of Designated Tax incentives.
3. Assessment of the capacity and capability of sectors in the region.
4. Decentralisation.
5. The impact of an element(s) of the National Spatial Strategy (NSS).

It was felt that all partners in the project should be advised of these possibilities so that a full and frank discussion could take place in order to pick the best scenario. This process would run parallel to the construction of the SAM, allowing the necessary matching process to work.

On the final day of the trip the group held a planning meeting in order to agree the next steps. It was agreed that once the SAM was constructed that the process of dissemination both in the BMW and elsewhere would begin. It was suggested that the Inverness Rural networks conference in June would be a good opportunity to present some initial findings as well as a description of the team's experiences.

In the longer term it was suggested that the BMW region could apply to host the fifth Rural Networks conference in 2005. It was suggested that within the project there was scope for developing a research centre such as CPAC (Missouri) or Arkleton (Aberdeen) which could provided high quality outreach facilities for rural communities. At this stage it was felt that the SAM project had the potential to be one of the starting blocks.

This concluded the trip to Missouri, which was a significant point of development for the project as a whole. Newly formed working relationships enabled the process of preparation for the arrival of Matt Fannin in Ireland to be completed with greater ease, while newly learned skills focused the attention of the Irish delegation on the job in hand.

MARCH 2003

Date: 10 March 2003

Location: Central Statistics Offices (CSO), Cork City

Attendees: Mr. Kevin McCormack (CSO)
Mr. Joe Madden (CSO)
Mr. Patsy King (CSO)
Mr. Steve Mac Feely (CSO)
Mr. Padraig Dalton (CSO)
Mr Tom McMahon (CSO)
Mr. Joe Tracey (CSO)
Mr. Jack O'Herlihy (LYIT)

A pivotal meeting in the whole process was that held in the CSO offices in Cork City on the 10th of March 2003. The SAM project was represented by Mr. Jack O'Herlihy, who had since October negotiated with the CSO about the access to data.

The meeting discussed each potential data source and agreed that the CSO would summarise the main points in relation to data availability and the need for further analysis. A table covering each area was constructed and forwarded to Matt Fannin the researcher specialising in data estimation and manipulation.

The SAM delegation indicated that it would be possible to bring Matt Fannin to Ireland In late April for a period of three months. It was agreed that on his arrival Matt would be appointed an Officer of Statistics at the CSO offices in Cork under the Statistics Act of 1993. Matt's purpose during this time would be to undertake detailed data analysis in order to compile the BMW input-output table. Following on from the success of discussions with senior officials at the CSO, Matt Fannin took up his position as Officer of Statistics at the Central Statistics Office, Cork. Working with senior officers of the CSO, Matt was able to access a wide range of data sets, which allowed the research team to compile rough-cut models quickly.

MAY 2003

Date: 13 May 2003

Location: Central Statistics Offices (CSO), Cork City

Attendees: Mr. Jack O'Herlihy (LYIT)
Prof. Tom Johnson (University of Missouri)
Mr Matt Fannin (University of Missouri)
Mr Simon Stephens (NUI Galway)
Prof Michael Keane (NUI Galway)
Mr Paul McCusker (LYIT)
Mr Joe Tracey (CSO Cork)
Representatives from the various statistical departments of the CSO.

The CSO hosted a one-day seminar on regional statistics; the outcomes of this workshop were as follows:

1. The nature and extent of the CSO cooperation and support of the project objectives was made explicit and senior members of the CSO agreed to work closely with the research team.
2. Initial discussions on a possible level of aggregation and number of sectors.
3. Joe Tracy, Director of Business Statistics, CSO, agreed to be a keynote speaker at the Seminar in Ballaghaderreen in July.

A brief listing of the divisional areas addressed including main discussion and conclusions were:

Sector	Main discussion points / conclusions
Industry	**Confidentiality** / Assume national industrial structure or aggregate sectors to disclose regional data **Transforming PRODCOM sales to production** / Devise reasonable imputation procedures and assumptions to estimate consumption with available data **Local consumption /** Use Supply Demand Pool Approach adjusted by imports/exports
Services	**Identifying detailed intermediate consumption** / Follow National Accounts approach by taking aggregated consumption sectors and adjusting similar EU member state's detailed consumption coefficients to create ROI coefficents **Identifying detailed secondary products and services** / Apply manufacturing percentages and make other reasonable assumptions with similar EU state's secondary service and product coefficients in the Service sectors to obtain estimates **Local consumption /** Use Supply Demand Pool Approach adjusted by imports/exports
Agriculture	**Identifying detailed intermediate consumption /** Identify detailed sectors used to create aggregate intermediate consumption categories; consult with Teagasc via agriculture division to discuss data used by CSO to construct inputs **Identifying secondary agricultural products by primary commodity type** / Use Census of Agriculture Production data classified by farm type to identify secondary ag. products produced **Mapping EU/Irish Farm Typology categories to CPA/NACE /** Create concordance to bridge between the two classifications **Local consumption /** Use Supply Demand Pool Approach adjusted by imports/exports
Households	**Disaggregation of households by income type** / Project partners choose desired income groupings based on desired breakdown of distributive effect by SAM; CSO re-aggregate raw data and evaluate to see if it meets confidentiality and statistical confidence checks. **Imputed rent /** Apply recommendation provided by Paddy McDonald to estimate an imputed rent statistic by household income category. Check estimates for statistical confidence. **Local consumption /** Use Supply Demand Pool Approach adjusted by imports/exports as the initial assumption for regional household consumption. Evaluate other survey and administrative data related to household to evaluate if an econometric apporach can be used to estimate regional consumption

Government	**Defining local government** / Apply approach used by National Accounts to distinguish local government from central government. **Identifying detailed accounts for local government /** Allow project partners to collect publicly available budgets and financial reports from local government units. Take advantage of any easily available, non-confidential collected data CSO may have either in Dublin or Cork. Project partners will map proprietary government accounts into detailed SAM production and consumption accounts. **Identifying transfers between the EU and BMW Region** / Identify exact procedure for transfer of Objective 1 and other funds from EU into BMW region. Discuss with Eurostat alternative approaches for modeling EU transfers into regional model. Evaluate feasibility of adding EU category as additional government sector or as a "Rest of the World" category

Based on the findings of the meeting with the CSO the project team agreed a work plan to be completed during the period of access to the CSO.

Task	Responsibility
Completion of Household Concordances	Matt & Simon
Completion of Irish/EU Farm Typology Concordances	Matt & Simon
Collection of Local Government Revenue and Expenditure Data 1) Define local government authorities and sectors 2) Collection of local authority data	 Matt Simon and Paul
Creating institutional data in CPA/NACE format 1) Households 2) Agriculture	Simon and Paul

As per an agreement reached on dissemination procedures during the trip to Missouri, Prof Tom Johnson, Matt Fannin and Louis Kinlen travelled to Inverness for the fifth Rural Networks Conference. Louise Kinlen presented a paper entitled "The Development of a regional SAM analysis system for the BMW region of Ireland. This paper outlined the practical experience of developing a SAM and how the BMW project was progressing. The main thrust of the paper was the immense potential held by a regional SAM in the area of policy development and implementation.

JULY 2003

Date: 1 July 2003

Location: BMW Assembly, Ballaghaderreen, Co Roscommon

Attendees: The audience for this seminar was drawn from a wide ranging pool, with representatives from sectors such as Education, Civil service, Public services, politics and the many organisations associated with regional development in Ireland.

The process of dissemination was strengthened with the hosting by the BMW of a seminar on the SAM project on Tuesday the 1st of July 2003. The programme for the seminar was as follows.

1. Presentation by Mr. Gerry Finn (Director of the BMW) on the Background to the SAM project.
2. Presentation by Matt Fannin (Missouri) & Joe Tracey (CSO) on the initial SAM and related findings.
3. Workshop 1: Data issues in constructing a regional SAM, hosted by Matt Fannin
4. Workshop 2: Policy applications for SAMs and the development of scenarios, hosted by Prof Tom Johnson & Prof Michael Keane
5. Feedback & Plenary session.

The Seminar was received very well by all with an exceptional interest shown in both of the afternoon workshops. The seminar gave the project some excellent publicity and developed an excellent base from which to continue the dissemination process. At a follow on meeting it was agreed by all partners of the project to initiate phase two of the project, which ran from Sept 2003 to Sept 2004 and a work-plan was prepared as follows

Work Package	Individual
Model Validation	Prof. Michael Keane
	CSO
Bridging Tables	Prof. Tom Johnson
	Dr. Matt Fannin
	Simon Stephens

	Paul McCusker
Dissemination	Jack O'Herlihy
	Simon Stephens
	Paul McCusker
Final SAM	Dr. Matt Fannin
Scenario	Prof. Tom Johnson

SEPTEMBER 2003

Date: 2 September 2003

Location: Central Statistics Office, Dublin

Attendees: Mr Jack O'Herlihy (LYIT)
Mr Simon Stephens (LYIT)
Mr Joe Tracey (CSO)
Mr Bill Keating (CSO)
Mr Patrick Quill (CSO)

On the completion of a years work on the SAM project a meeting between Mr Jack O'Herlihy, Simon Stephens, Mr. Joe Tracey, Bill Keating, Patrick Quill and a video link to representatives at the CSO offices in Cork took place in the CSO in Dublin. The meeting proceeded as follows:

The SAM Model: The SAM delegation assured the CSO that we would have the model as agreed with a commitment to applying it in one scenario for the BMW. While Matt has been working closely with the CSO they raised some issues relating to areas such as confidentiality that also need to be cleared prior to releasing the model. The CSO placed a heavy emphasis on the necessity of validation of the model prior to it being released or applied.

Validation: The CSO expressed themselves willing to assist Prof. Michael Keane in the process of validation. They were to be given the model and all the necessary documentation explaining its construction.

Identification of Gaps: The CSO expressed interest in the team identifying any gaps in the information that were identified in building the SAM or areas where we thought things could be done better. The reason they desired a response is that they are in the process of finalizing their

development strategy for the next five years and want input from the SAM project into this process.

Future actions: CSO are pleased with progress to date and expressed a willingness to continue to assist the project with updating information and validating the work of the project.

OCTOBER 2003 – FEBRUARY 2004

During the months of October through to February the project team completed the construction of an Input-Output table for the BMW region. This construction generated data for the region at a sectoral level giving us values for Output and profit as well as the level of taxes/subsidies and wages paid in the region. These initial results were then submitted to the CSO and Prof. Michael Keane for validation. This process involved the checking of the methodology used and the validity of all assumption as well as the accuracy and reliability of the data sets. Although an extremely time consuming task it was felt by project management that given the uniqueness of the project such testing was necessary before the process of dissemination could begin.

MARCH 2004

Date: 15 March 2004

Location: BMW Assembly, Ballaghaderreen, Co Roscommon

Attendees: Kieran Moylan (BMW)
Yvonne Keating (BMW)
Cllr. Kathleen Quinn (Western Regional Authority)
Cllr. Gerry Dolan (Border Regional Authority)
Cllr. Ray Cribbin (Midland Regional Authority)
Mr. John Andy Bonar (LYIT)
Mr. Simon Stephens (LYIT)

The initial findings and statistics from the completed Input-Output table were presented at BMW headquarters on the 15th of March 2004 by Simon Stephens.

He presented the group with the initial findings using a classification system developed by statistics UK. The presentation outlined the values of the seven main areas of economic activity, agriculture, mining, manufacturing, construction, wholesale, transport and services under the following headings:

- Intermediate Consumption
- Gross Value Added.
- Employee compensation
- Taxes less Subsidies
- Operating Surplus
- Total Output

Table from Input-Output

	Inter Cons	GVA	Employee Comp	Taxes - Subs	Op Surplus	Total Output
Agri	€1,234,654,467	€1,358,551,000	€146,545,289	-€173,008,000	€1,385,013,711	€2,593,205,467
Mining	€165,134,673	€181,152,317	€105,629,893	€4,263,107	€71,259,318	€346,286,990
Manufacture	€5,347,763,469	€9,885,926,375	€1,795,129,274	€39,350,635	€8,051,446,465	€15,233,689,844
Construction	€492,450,066	€267,557,262	€164,304,791	€11,580,100	€91,672,372	€760,007,328
Wholesale	€562,343,833	€1,120,325,986	€551,005,030	€48,651,132	€520,669,824	€1,682,669,818
Transport	€402,309,565	€638,566,735	€289,896,301	€12,626,393	€336,044,040	€1,040,876,299
Services	€9,006,238,752	€15,075,435,975	€3,729,440,685	-€60,707,704	€11,406,702,994	€24,081,674,727

The meeting acknowledged the value of having detailed data for thirty six sectors in the economy and welcomed the completion of the SAM model and the regional multipliers.

APRIL – MAY 2004

Matt completed the transformation of the Input-Output tables to a 36 sector balanced regional SAM. On completion of this work a five day working group was organised for June.

JUNE 2004

Date: 14 – 18 June 2004

Location: Central Statistics Office, Dublin and Letterkenny Institute of Technology

The work began with a meeting of Tom Johnson, Matt Fannin and Simon Stephens and the CSO at their headquarters in Dublin. At the meeting in depth discussions were held to validate all the numbers and multiplier values in the SAM. The recommendations of the CSO were noted and the project team worked at LYIT to incorporate these requirements. The outcome was a balanced regional model and a set of multipliers that had been validated by the CSO.

The conclusion of the week was a presentation of the completed work at BMW headquarters. In attendance at the meeting were:

Attendees:

Mr. Gerry Finn (BMW)
Mr. Kieran Moylan (BMW)
Ms. Yvonne Keating (BMW)
Mr. Jack O'Herlihy (LYIT)
Prof. Michael Keane (NUIG)
Prof. Tom Johnson (Missouri)
Dr. Matt Fannin (Louisiana)
Mr. Simon Stephens (LYIT)

At the meeting Matt presented his work and the completed SAM and multipliers were put to the group for discussion. The group acknowledged the value of working with the CSO and the level of sophistication achieved. The group then led by Tom Johnson started discussions on the scenario. Tom proposed a scenario based on the proposed Western rail corridor (WRC). He explained that the project had immense potential and that although the national rail review had not come out in favour of it the SAM could offer a more detailed explanation of the impact of such an investment. The group reached an agreement on the scenario which would attempt to focus on possible tourism spin-offs.

The dissemination process continued with Simon Stephens giving two further presentations. Simon outlined the work of the project and provided examples of the newly created data set to the Steering committee of the regional foresight study at their meeting in Athlone on July 1st 2004. A similar presentation was given at the prestigious International Comparative Rural Policy summer school at Guelph University on July 8th 2004. Present at this school were Professors and graduates of regional studies from Universities of Missouri-Columbia USA, Autonomous University of Barcelona, University of Leuven, Brandon University, the University of Guelph, the University of Aberdeen, and the Economics and Business Studies Program of Budapest. The project work was very positively received. The researchers spoke of the lack of regional statistics in their respective countries and the practical benefits of researchers working in partnership with a national statistics office to generate such a data set.

SEPTEMBER 2004

Date: 6 September 2004

Location: Letterkenny Institute of Technology

Attendees: The audience for this seminar was drawn from a wide ranging pool, with representatives from sectors such as Education, Civil service, Public services, politics and the many organisations associated with regional development in Ireland.

The completion of all work packages since July 2003 led to a seminar hosted by LYIT on September 6th 2004.

The programme for the seminar was as follows:

SESSION I: Introduction to the SAM PROJECT

Chair: Kieran Moylan, Assistant Director BMW Regional Assembly

Information for Policy - CSO's role in the BMW SAM Project.

Joe Treacy, Director, Business Statistics and Administration, CSO

Building the BMW SAM

Matt Fannin, Louisiana State University

Simon Stephens, LYIT

SESSION II: SAM as a tool to aid policy decision-making

Chair: John Andy Bonar Head of School of Business Studies, LYIT

Using SAM in a Scenario: Western Rail Corridor

Tom Johnson, University of Missouri

SESSION III: Importance of Evidence Based Regional Policy Making

Chair: Colm Butler, Department of an Taoiseach

Approaches to modelling regional economies: A Comparative study of Ireland, Scotland, Finland and Denmark

Simon Stephens LYIT

Regional Policy Evaluation and Appraisal.

Michael Keane, NUI Galway

The seminar began with Matt Fannin and Joe Treacy[4] describing in detail the process of construction and the methodology used to overcome the various challenges. They highlighted the strict adherence to Eurostat protocol and CSO standards for the publication and distribution of official statistics.

In the second session Tom Johnson give the group a run through the steps involved producing a scenario using the SAM. He presented the group with a very positive picture of the likely short-term and long-term impacts of the WRC as shown in the following tables: The tables of results as presented[5] by Tom show the potential economic benefits to the region of such an investment. The SAM provides us with statistics across all thirty six sectors showing the changes in supply and demand as a result of the WRC for example:

[4] See Appendix 2
[5] See Appendix 3

- Construction sector increases by €1,913,000
- Retail sales increases €5,644,000
- Hotels and restaurants €11,603,000
- Land Transport €6,458,000
- Automobile repair and fuel -€4,645,000
- Increased tax revenues €3,776,000

The presentation of the scenario was followed by a question an answer session in which the relevant strengths and weaknesses of this type of evaluation were discussed. The overall opinion was that the SAM through scenarios offered the opportunity for evidence based policy formulation.

In the final session Simon Stephens presented the findings of a comparative study[6] between the SAM project and similar work taking place in Scotland, Denmark and Finland. The study showed that SAM project had developed a strong partnership group which had been crucial to its success; also the adoption of Eurostat's rules had given the finished model great validity. Simon then pointed to potential improvements that could be made based on the success of different aspects of the other projects for example the need to create a system for the collection of regional statistics and the need to investigate the possibility of further disaggregation of the model . The discussion which followed agreed with these needs while also highlighting the need for further scenarios and the development of a similar model for the South and East region (SOE).

The final speaker was Prof. Michael Keane[7] who presented a paper on the needs for evidence based policy evaluation. He spoke in detail about the lack of in-depth evaluation of policies and welcomed the SAM as a potential source of evidence for evaluation of a wide range of projects within the region. The seminar was closed by Jack O'Herlihy who thanked all the members of the project team for their work in creating the model and producing the first scenario.

[6] See Appendix 4
[7] See Appendix 5

SECTION 5: FUTURE STEPS:

Throughout the series of presentations and the two seminars as well as project team meetings a wealth of ideas and advice about what would be the best way forward for the project were developed. They include:

- Construction of a series of scenarios
- The development of a SAM for the Southern and Eastern region.
- Development of a SAM at NUTs 3 level.
- Introduction of Social & Environmental elements

Phase 1 of the project has seen the development of a methodology which through the use of conventions and techniques based on Eurostat guidelines has resulted in a best practice prototype. The challenge moving forward for the project is three-fold:

1. The model must be tested through the creation of scenarios which can offer reliable indicators to policy makers on the returns available from various investment strategies. This process is anticipated to be charaterised by on going refinement and development that allows the model to develop a greater level of sophistication. Such a process will allow the BMW authorities to developed targeted policies which can aid the convergence process. Beyond this there is potential to further regionalize the model so that a SAMs are created at a NUTs III level

2. One of the inherit obstacles in the creation of the SAM was a lack of data for all the institutions and industries in the economy. Beyond this problem the various difficulties in regionalising our completed dataset mean that there is scope for the project team to aid the CSO in its attempts to:[8]
   a. To provide statistics of the high quality required for making and assessing policy.
   b. To fill the gaps in the underdeveloped area of social statistics.

[8] Progress report on the Implementation of 'Strategy for statistics 1998-2002'

c. To improve the coordination of the statistics being produced by Government Departments and agencies.

d. To ensure that the statistics produced are as accessible and as widely available as possible to contribute to their widest possible use.

One of the limitations of a SAM is the huge data requirement. A variety of data sources were required in order to construct our SAM. In the construction of the SAM, project members were confronted with a range of practical problems for example dealing with different survey practices, definitions, timing, coverage etc moving forward the project team need to identify strategies to resolve these problems and improve the datasets available to researchers.

3. The project team has identified the need to streamline the process of scenario building so that the maximum quality and volume of output can be generated. Current approaches can be very time consuming and affect the marketability of the SAM as a tool to the policy maker.

SECTION 6: CONCLUSION:

The SAM presented in this report was the first attempt to construct a sub-national national SAM for a NUTS 2 region of Ireland. It was constructed entirely from previously collected secondary data from government agencies predominantly obtained through a partnership the CSO. Gaps in the data were addressed using common conventions of SAM model construction. To the greatest extent possible, guidelines for SAM construction from the European System of Accounts 95 were followed. In addition, multipliers were calculated from the SAM tables including specific sector output, income, and value added multipliers. The generation of these multipliers has allowed the project team to create a scenario which was presented at the end of project seminar.

The creation of a sophisticated regional data set using a partnership approach is the primary outcome of this project. Additional achievements include:

- The forging of a successful working relationship with the CSO.
- Establishment of institutional links with the University of Missouri and Louisiana State University.
- The creation of a manual detailing the construction of the SAM
- The creation of bridging tables for converting CSO codes to NACE Rev. 1 codes.
- The production of a detailed regional statistical dataset.
- A SAM multiplier and impact report
- The creation of a scenario using the BMW SAM.
- The hosting of two successful seminars on regional modelling.

Moving forward it is envisaged that the dissemination process will continue through a number of papers, one will focus on an evaluation of regional datasets and the second will be a comparative study of four attempts at regional modelling using an input-output template. These papers will be presented at the International Rural Network Conference and the International Rural Policy summer school in the summer of 2005.

APPENDIX 1 – SAM TEMPLATE & TABLE OF MULTIPLIERS

BMW Aggregate SAM Template.

Account		Goods and Services (Products)	Production (industries)	Product Taxes Less Product Subsidies	Factors of Production			Allocation of Primary Income (institutional sectors)				Capital Account	Rest of the World
		CPA Sectors 01-99	NACE Rev 1 Sectors 01-99		Comp of Employees	Other Taxes Less Subsidies on Production	Operating Surplus, net	Households	Enter-prises	Local Gov	Central Gov		
Goods and Services (Products)	CPA Sectors 01-99		Intermediate consumption					Household Consumption		Local Gov Consumption of products	Cen Gov Consumption of products	Gross fixed capital formation, change in inventories	Exports
Production (industries)	NACE Rev 1 Sectors 01-99	Output											
	Product Taxes Less Product Subsidies	Excise and Value Added Taxes											
Factors of Production	Compensation of Employees		Wages, salaries										BMW resident income earned abroad
	Other Taxes Less Subsidies on Production		Non-product taxes less non-product subsidies										
	Operating Surplus, net		Corporate and proprietor income										

BMW SAM Template (Continued).

Account		Goods and Services (Products)	Production (industries)	Product Taxes Less Product Subsidies	Generation of Income (primary input categories)			Allocation of Primary Income (institutional sectors)				Capital Account	Rest of the World
		CPA Sectors 01-99	NACE Rev 1 Sectors 01-99		Comp of Employees	Other Taxes Less Subsidies on Production	Operating Surplus, net	Households	Enterprises	Local Gov	Central Gov		
	Households				Domestic wage and salary Income		Dividends, Interest, and Rent			Loc Gov Transfers to HH	Cen Gov Transfers to HH		
	Enterprises						Net retained earnings			Enterprise subsides	Enterprise subsidies		
Allocation of Primary Income (institutional sectors)	**Local Government**							Rates, other payments to local gov, health boards, VECs			Cen Gov Transfers to Loc Gov		
	Central Government			Product Tax income		Non-product Tax income	Corporate Income Taxes	Income taxes		Loc Gov Transfers to Cen Gov		Capital Payments to Central Gov	Central Gov Borrowing from ROW Foreign financing of Capital Account
Capital Account			Depreciation					Savings	Net Retained Earnings	Loc Gov Savings	Cen Gov Savings		
Rest of the World		Imports			Wages of non-BMW residents		Income from foreign ownership of BMW enterprises				Cen Gov Transfer Payments to ROW	Imported Capital Goods	

Aggregate BMW SAM, 2000.

		Products	Industries	Product Taxes	Employee Compensation	Non-Product Taxes	Net Operating Surplus	Households	Enterprises	Local Government	Central Government	Capital Account	Rest of the World	Total
		1	2	3	4	5	6	7	8	9	10	11	12	
Products	**1**		11,428,890	367,111				7,555,624		798,519	314,654	4,075,116	18,911,848	43,451,764
Industries	**2**	24,918,877												24,918,877
Product Taxes	**3**	2,885,897												2,885,897
Employee Compensation	**4**		4,361,951							846,464	701,632		1,152,009	7,062,056
Non Product Taxes	**5**		-43,214											-43,214
Net Operating Surplus	**6**		7,028,301										2,934,504	9,962,805
Households	**7**				6,556,656		1,865,982			555,872	2,683,780		0	11,662,289
Enterprises	**8**						1,163,108			21,687	150,383		0	1,335,177
Local Government	**9**							626,998			2,196,323			2,823,320
Central Government	**10**			2,518,785		-43,214	857,516	2,595,895		16,677		174,191	214,100	6,333,950
Capital Account	**11**		2,142,950					883,772	1,335,177	584,102	169,678		506,267	5,621,947
Rest of the World	**12**	15,646,989			505,400		6,076,199				117,500	1,372,640		23,718,729
Total		43,451,764	24,918,877	2,885,897	7,062,056	-43,214	9,962,805	11,662,289	1,335,177	2,823,320	6,333,950	5,621,947	23,718,729	

Industry and Commodity Multipliers from the BMW SAM.

Sector	Industry Output Multiplier	Industry Income Multiplier	Industry Value Added Multiplier	Commodity Output Multiplier	Commodity Income Multiplier	Commodity Value Added Multiplier
Agriculture	1.93	3.72	1.98	1.95	3.81	2.00
Forestry	1.50	1.30	1.38	1.49	1.30	1.37
Fishing	1.75	2.80	1.64	1.77	2.86	1.66
Mining	1.96	1.75	1.79	2.09	1.85	1.88
Manufacture of Food, Beverage, and Tobacco Products	1.88	3.38	1.79	1.71	3.00	1.64
Manufacture of textiles	1.72	1.64	1.62	1.62	1.54	1.57
Manufacture of Wearing Apparel; Dressing and Dyeing of fur	1.53	1.60	1.38	1.76	1.84	1.56
Tanning of Lather; Manufacture of Bags and Footwear	1.81	1.46	1.72	2.08	1.63	1.95
Manufacture of Wood Products	2.08	2.28	2.14	2.08	2.27	2.13
Manufacture of Pulp and Paper Products, Printed and Recorded Media	1.92	2.08	1.88	1.91	2.07	1.88
Manufacture of Chemicals and Chemical Products	1.99	2.48	1.97	1.87	2.30	1.86
Manufacture of Rubber and Plastic Products	1.96	1.86	1.88	1.97	1.87	1.90
Manufacture of other Non-Metallic Mineral Products	1.94	2.07	1.82	1.75	1.85	1.66
Manufacture of Basic Metals	2.44	3.01	2.65	2.51	3.10	2.72
Manufacture of Fabricated Metal Products	2.21	2.08	2.12	2.08	1.96	2.00
Manufacture of Machinery and Equipment	1.97	2.04	1.80	1.90	1.98	1.75
Manufacture of Office Machinery and Computers	2.10	3.35	2.19	2.08	3.23	2.16
Manufacture of Electrical Machinery	2.09	2.27	2.08	2.30	2.51	2.28
Manufacture of Radio, Television and Communication Equipment	1.82	2.46	1.69	1.70	2.26	1.60
Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	1.66	1.80	1.50	1.64	1.77	1.49
Manufacture of Motor vehicles, Semi-trailers, and Other Transport Equipment	2.06	1.84	1.99	2.05	1.84	1.99

Sector	Industry Output Multiplier	Industry Income Multiplier	Industry Value Added Multiplier	Commodity Output Multiplier	Commodity Income Multiplier	Commodity Value Added Multiplier
Manufacture of Petroleum, Furniture, and Other Manufacturing; Electricity, Gas, and Water	1.79	1.76	1.59	1.92	1.88	1.69
Construction	2.25	2.25	2.60	2.25	2.27	2.61
Sale and Repair of Motor Vehicles and Auto Fuel	1.79	1.45	2.05	1.77	1.44	2.01
Wholesale Trade	1.56	1.48	1.54	1.55	1.47	1.53
Retail Trade	1.53	1.37	1.60	1.53	1.36	1.59
Hotels and Restaurants	1.65	1.47	1.80	1.66	1.48	1.80
Land Transport	2.12	2.14	12.49	2.08	2.09	11.82
Water and Air Transport; Transport Services	1.46	1.36	1.57	1.46	1.36	1.57
Financial Intermediation	2.05	2.30	4.89	2.04	2.30	4.86
Real Estate	1.07	2.38	1.03	1.07	2.37	1.03
Renting of Machinery and Equipment	1.71	1.86	1.82	1.69	1.85	1.79
Computer Services	1.55	1.32	1.56	1.54	1.32	1.55
Research and Development	1.15	1.16	1.11	1.15	1.16	1.11
Other Business Activities	1.55	1.47	1.56	1.54	1.46	1.55
Other Public and Private Services	1.44	1.43	1.39	1.43	1.42	1.38

APPENDIX 2: A Social Accounting Matrix System and Multipliers for the Border, Midland and Western (BMW) Region of Ireland

J. Matthew Fannin

Executive Summary

This report outlines the products produced from the development of a Social Accounting Matrix (SAM) system for the Border, Midland, and Western (BMW) region of Ireland. A consortium of the Letterkenny Institute of Technology, the University of Missouri, the National University of Ireland Galway, and the Central Statistics Office formed to develop the SAM modeling framework that could be used to measure economic conditions of the region as well as provide a tool to assist in policy analysis.

The SAM was constructed primarily from regional data provided by the CSO. It contains 36 detailed products sectors of the BMW economy as well as sectors outlining the main factors of production, institutional accounts, and the rest of the world.

Key findings from the model include:

- Industries in the BMW region produced over 34 billion euros worth of products in 2000. Gross value added in the same period exceeded 17.4 billion euros.

- Approximately 8.1 billion euros, or 46 percent of total gross value added were paid to employees in the form of wages and salaries. An additional 2.3 billion euros were paid to individuals who were self-employed.

- In 2000, 4.8 billion euros was generated as operating surplus (net of depreciation) by BMW local units. Approximately 62 percent of that operating surplus was paid to investors in these local units outside the region.

- The highest output multiplier for the BMW region came from the Office Machinery and Computers sector with a multiplier of 1.96. For every one euro increase in demand for products of the Office Machinery and Computers sector, there was a total increase in output across all sectors of the economy of 1.96 euros. Additional high output multipliers were found in the Wood Products sector and Agriculture sector.

- The largest labor and proprietor income multipliers were found in the Office Machinery and Computers sector, the Food, Beverage and Tobacco Products sector, and the Wood Products sector.

- The largest value added multipliers were found in the Office Machinery and Computers sector, the Wood Products sector, and the Pulp and Paper Products, Printed and Recorded media sector.

- SAM estimates closely matched CSO published estimates for the BMW region. The total gross value added estimate matched within 0.10 percent of CSO estimates for the region.

Introduction to SAM Framework

A social accounting matrix (SAM) can serve as both a data system and a conceptual framework for policy analysis (Pyatt and Thorbecke 1976). That is, a SAM can provide both descriptive as well as prescriptive policy analysis. The SAM framework is able to directly address both the sectoral and distributional dimensions of regional economic development, and through the use of inter-regional models, the spatial dimension. (Johnson 1994).

As a data system, the SAM is a table (or matrix) consisting of rows and columns representing sectors of the economy. These sectors traditionally correspond to five main accounts in the regional economy: production activities, factors of production, institutions, capital, and the rest-of-the-world (Isard et al. 1998). The number of rows in a SAM table must equal the number of columns; that is, each sector in the economy is identified with both a row and a column.

Whereas the SAM provides an overall description of the financial flows to and from sectors within and outside the regional economy, (the "anatomy" of the economy), it does not provide a basis from which most policy analysis can be conducted. The "physiology" of the regional economy is required and is obtained in the regional SAM through applying basic economic assumptions about the regional economy to the SAM. Based upon these assumptions, a matrix can be estimated that allows for the calculation of output, income, and value added effects and multipliers for each of the detailed sectors of the economy. In addition, combining the unique relationships explained by the multipliers between these sectors with a policy scenario based on the changing demands of final goods and services in the economy results in the estimation of indirect and induced impacts in the economy as well as the construction of unique multipliers for each policy scenario.

Data Elements Used in Constructing SAM

The SAM framework requires measuring all financial flows into and out of the BMW regional economy. Identifying all the flows through the production, consumption, and distribution sectors of the economy require extensive data sources covering all sectors of the economy. The primary source for data for the BMW SAM was supplied by the CSO. These data included statistics from production sectors of the economy such as agriculture, industry, and services; consumptive sectors of the economy such as households, as well as the distributive sectors of the economy identified by government. In some cases, data requirements for the SAM were not collected or estimated from the CSO or other republic agencies. In these cases, best practice conventions and assumptions were used based on regional economic theory. A list of all CSO data sources used in the compilation of the BMW SAM can be found in the Appendix A1. Procedures used in compiling the SAM can be acquired from the authors.

SAM Tables

A template used for the construction of the detailed SAM is presented in Table 1. This template shows the flows of resources into and out of the various sectors of the economy. The table identifies the production activities of industry, the generation of income by institutional sectors of the economy as well as their consumption and distribution between institutions. The product and industry sectors in Table 1 are aggregated for purposes of presentation[9]. A total of 36 product and industry sectors were used to create the BMW SAM. These sectors are based on European Union CPA product and NACE Rev 1 industry classifications. An aggregate form of the SAM which consolidates the 36 product and industry sectors into individual product and industry sectors is presented in Table 2. A few items from the aggregate SAM are worth additional description. First, BMW industries produced over 34 billion euros worth of product in 2000 (Industries row, Products column). This output included agricultural, manufacturing, as well as market and non-market service industries. Total gross value added for the BMW region is estimated to be just over 17.4 billion euros. Approximately 8.1 billion euros, or 46 percent, of total gross value added were paid to workers employed in the BMW region (Employee Comp row, Industries column). Almost 2.3 billion, or 12.8 percent, of gross value added were distributed as earnings to the self-employed (Self-Employed Earnings row, Industries column). Also, 4.8 billion euros of total gross value added was generated as operating surplus (net of depreciation) (Net Operating Surplus row, Industries column). This surplus accounted for 28 percent of total gross value added.

It is also noteworthy that foreign ownership investments of BMW region companies receive a majority of the net operating surplus of regional production activities. In 2000, just over 3 billion euros of the 4.8 billion euros left the BMW region to pay for these local capital investments, or 62 percent of the net operating surplus (Rest of the World row, Net Operating Surplus column. These include capital investments from investors outside of the republic as well as South and East region investors. This financial outflow was primarily financed by the small trade surplus in the region of just over 2 billion euros.

The BMW SAM estimates of aggregate economic activity compare favorably with the estimates provided by the Central Statistics Office. The estimate of gross value added fell within .10 percent of CSO's aggregate estimate. The Agriculture, Forestry, and Fishing sector estimates from the SAM model were within 0.80 percent of CSO's estimate for these sectors. Gross Value Added estimates for the Manufacturing, Building, and Construction sector and the Market

[9] The detailed SAM is a square table consisting of 83 row and column sectors. These include 36 CPA-based product sectors, 36 NACE Rev 1 based industry sectors, five factors of production, four institutional accounts, the capital account, and the rest of the world account.

Table 1. BMW Aggregate SAM Template.

Account		Goods and Services (Products)	Production (industries)	Product Taxes Less Product Subsidies	Factors of Production (Primary Inputs)				Allocation of Primary Income (institutional sectors)				Capital Account	Rest of the World
		CPA Sectors 01-99	NACE Rev 1 Sectors 01-99		Comp of Employees	Other Taxes Less Subsidies on Production	Self-Employed Earnings	Operating Surplus, net	Households	Enter-prises	Local Gov	Central Gov		
Goods and Services (Products)	CPA Sectors 01-99		Intermediate consumption	Product Subsidies					Household consumption				Gross fixed capital formation, change in inventories	Exports
Production (industries)	NACE Rev 1 Sectors 01-99	Output												
	Product Taxes	Excise and value added taxes												
Factors of Production	Compensation of Employees		Wages, salaries											BMW resident income earned abroad
	Other Taxes Less Subsidies on Production		Non-product taxes less non-product subsidies											
	Self-Employed Earnings		Proprietor Income											
	Operating Surplus, net		Business income											Investment income earned abroad

Table 1. BMW SAM Template (Continued).

Account		Goods and Services (Products)	Production (industries)	Product Taxes Less Product Subsidies	Factors of Production	Factors of Production			Allocation of Primary Income (institutional sectors)				Capital Account	Rest of the World
		CPA Sectors 01-99	NACE Rev 1 Sectors 01-99		Comp of Employees	Other Taxes Less Subsidies on Production	Self-Employed Earnings	Operating Surplus, net	Households	Enterprises	Local Gov	Central Gov		
Factors of Production (Primary Inputs)	Households				Domestic wage and salary income		Proprietor income to HH	Dividends, interest, and rent			Loc gov transfers to HH	Cen gov transfers to HH		
	Enterprises							Net retained earnings			Enterprise subsides	Enterprise subsidies		
	Local Government								Rates, other payments to local gov, health boards, VECs			Cen gov transfers to Loc gov		
	Central Government			Product tax income		Non-product tax income		Corporate income taxes	Income taxes		Loc Gov transfers to Cen gov		Capital payments by Cen Gov	Central Gov borrowing from ROW
Capital Account			Depreciation						Savings	Net retained earnings	Loc gov savings	Cen gov savings		Foreign financing of capital account
Rest of the World		Imports			Wages of non-BMW residents			Income from foreign ownership of BMW enterprises				Cen gov transfer payments to ROW	Imported capital goods	

Table 2. Aggregate BMW SAM, 2000 (thousands euros).

	Products	Industries	Product Taxes	Employee Comp.	Non-Product Taxes	Self-Employed Earnings	Net Operating Surplus	Households	Enterprises	Local Govt.	Central Govt.	Capital Account	Rest of the World	Total
Products		16,767,898	427,592					11,902,548				4,104,723	17,452,401	50,655,163
Industries	34,243,172													34,243,172
Product Taxes	2,885,897													2,885,897
Employee Comp.		8,097,625											852,158	8,949,783
Non Product Taxes		20,976												20,976
Self-Employed Earnings		2,273,880												2,273,880
Net Operating Surplus		4,847,050											837,508	5,684,559
Households				8,143,087		2,273,880	1,332,676			1,263,559	3,321,712			16,334,914
Enterprises							641,262			61,385	231,769			934,417
Local Govt.								539,161			2,345,174			2,884,335
Central Govt.			2,458,305		20,976		683,249	2,886,659		42,291		149,579	142,055	6,383,113
Capital Account		2,235,743						1,006,546	934,417	1,517,101	239,964		96,746	6,030,517
Rest of the World	13,526,094			806,696			3,027,371				244,493	1,776,215		19,380,869
Total	50,655,163	34,243,173	2,885,897	8,949,783	20,976	2,273,880	5,684,559	16,334,914	934,417	2,884,335	6,383,113	6,030,517	19,380,869	

and Non-Market Services sectors were 11 percent above and 10 percent below CSO's estimates respectively. Much of this discrepancy is hypothesized to occur in a technical detail of the estimation process where the wholesale and retail margins of the total cost of manufactured goods are transferred from the manufacturing sectors to the trade sectors resulting in a simultaneous reduction in value added for industry and an increase in trade. The best available data were used to estimate and distribute these margins accordingly. Increased accuracy of margin estimation will result in a closer approximation to CSO estimates in future models.

SAM Multipliers

The elements of the SAM tables are combined with assumptions that describe the physiology of the economy to solve a mathematical system that calculates a "matrix of multipliers." This matrix of multipliers is also used to calculate sector-based multipliers for a region. Many types of multipliers have been calculated for the BMW region including output, labor and proprietor income and value added multipliers. Simple industry and product multipliers for the BMW region are presented in Table 3.

The interpretation of multipliers in Table 3 is best given through an example. The industry output multiplier for Agriculture is 1.62. Interpreted, for a one Euro final change in demand for Agricultural industry products, there is a total change in industrial output across all sectors of the BMW economy of 1.62 euros. The labor and proprietor income multiplier for Agriculture is 1.46 and is interpreted similarly: for every one euro increase in labor and proprietor income paid to the Agricultural sector, there is a total increase in labor and proprietor income of 1.46 Euros across all sectors of the BMW economy. The industry value added multiplier for Agriculture is 1.58. This multiplier indicates that for every one Euro increase in value added payments to Agriculture, there is a total increase in value added payments across all sectors of the BMW economy of 1.58 euros.

The largest simple industry output multiplier for the BMW regional economy was the Office Machinery and Computers (30) sector with an output multiplier of 1.96. This was followed by the Wood Products (20) sector with an output multiplier of 1.71 and Agriculture (01) with an output multiplier of 1.62. Further, the Office Machinery and Computers sector had the largest labor and proprietor income and value added multipliers at 2.99 and 2.29 respectively. A list of the top five simple industry output, labor and proprietor income, and value added multipliers are presented in Table 4.

Table 3. Industry and Product Multipliers from the BMW SAM.

		Simple Industry Multipliers			Simple Product Multipliers		
CPA / NACE	**Description**	**Output**	**Labor & Proprietor Income**	**Value Added**	**Output**	**Labor & Proprietor Income**	**Value Added**
01	**Agriculture**	1.62	1.46	1.58	1.63	1.46	1.59
02	**Forestry**	1.21	1.16	1.17	1.21	1.16	1.17
05	**Fishing**	1.27	1.46	1.23	1.26	1.45	1.23
10-14	**Mining**	1.33	1.28	1.33	1.34	1.29	1.34
15-16	**Manufacture of Food, Beverage, and Tobacco Products**	1.48	2.93	1.53	1.48	2.93	1.53
17	**Manufacture of textiles**	1.53	1.48	1.56	1.55	1.51	1.56
18	**Manufacture of Wearing Apparel; Dressing and Dyeing of fur**	1.36	1.44	1.29	1.41	1.48	1.33
19	**Tanning of Lather; Manufacture of Bags and Footwear**	1.50	1.29	1.58	1.50	1.30	1.58
20	**Manufacture of Wood Products**	1.71	1.86	1.84	1.71	1.86	1.84
21-22	**Manufacture of Pulp and Paper Products, Printed and Recorded Media**	1.50	1.67	1.62	1.51	1.68	1.63
24	**Manufacture of Chemicals and Chemical Products**	1.40	1.64	1.42	1.40	1.65	1.42
25	**Manufacture of Rubber and Plastic Products**	1.55	1.56	1.56	1.56	1.57	1.57
26	**Manufacture of other Non-Metallic Mineral Products**	1.44	1.51	1.44	1.43	1.47	1.43
27	**Manufacture of Basic Metals**	1.30	1.46	1.38	1.28	1.41	1.35
28	**Manufacture of Fabricated Metal Products**	1.38	1.39	1.40	1.38	1.39	1.39
29	**Manufacture of Machinery and Equipment**	1.41	1.47	1.40	1.40	1.46	1.40
30	**Manufacture of Office Machinery and Computers**	1.96	2.99	2.29	1.97	2.89	2.27
31	**Manufacture of Electrical Machinery**	1.50	1.56	1.59	1.49	1.55	1.57
32	**Manufacture of Radio, Television and Communication Equipment**	1.44	1.71	1.40	1.47	1.75	1.43
33	**Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks**	1.34	1.41	1.28	1.34	1.41	1.29

		Simple Industry Multipliers			Simple Product Multipliers		
CPA / NACE	**Description**	**Output**	**Labor & Proprietor Income**	**Value Added**	**Output**	**Labor & Proprietor Income**	**Value Added**
34-35	**Manufacture of Motor vehicles, Semi-trailers, and Other Transport Equipment**	1.34	1.26	1.32	1.34	1.27	1.32
23,36-37,40-41	**Manufacture of Petroleum, Furniture, and Other Manufacturing; Electricity, Gas, and Water**	1.45	1.44	1.43	1.45	1.45	1.43
45	**Construction**	1.49	1.57	1.61	1.49	1.58	1.62
50	**Sale and Repair of Motor Vehicles and Auto Fuel**	1.19	1.13	1.18	1.18	1.13	1.18
51	**Wholesale Trade**	1.15	1.15	1.13	1.14	1.15	1.12
52	**Retail Trade**	1.17	1.19	1.16	1.17	1.19	1.16
55	**Hotels and Restaurants**	1.22	1.21	1.21	1.22	1.20	1.21
60	**Land Transport**	1.25	1.24	1.41	1.24	1.23	1.39
61-64	**Water and Air Transport; Transport Services**	1.19	1.14	1.14	1.19	1.14	1.14
65-67	**Financial Intermediation**	1.29	1.55	1.52	1.29	1.55	1.52
70	**Real Estate**	1.02	1.01	1.01	1.02	1.01	1.01
71	**Renting of Machinery and Equipment**	1.16	1.22	1.15	1.16	1.21	1.15
72	**Computer Services**	1.13	1.09	1.12	1.13	1.09	1.12
73	**Research and Development**	1.04	1.04	1.02	1.04	1.04	1.02
74	**Other Business Activities**	1.12	1.12	1.11	1.12	1.12	1.11
75-99	**Other Public and Private Services**	1.22	1.14	1.17	1.22	1.14	1.17

Table 4. Top 5 Simple Industry Output, Labor and Proprietor Income and Value Added Multipliers for the BMW Region.

Rank	Simple Industry Output	Simple Labor and Proprietor Income	Simple Value Added
1	Office Machinery and Computers	Office Machinery and Computers	Office Machinery and Computers
2	Wood Products	Food, Beverage, and Tobacco Products	Wood Products
3	Agriculture	Wood Products	Pulp and Paper Products, Printed and Recorded Media
4	Rubber and Plastic Products	Radio, Television and Communication Equipment	Construction
5	Textiles	Pulp and Paper Products, Printed and Recorded Media	Electrical Machinery

The commodity multipliers in Table 4 are based on the same core data from the BMW SAM but are interpreted slightly different. For a one Euro final demand change for a product, there is a total change in product output across all sectors of the BMW economy by the size of the multiplier. This is a slight difference as compared to the industry multiplier because it restricts the change in final demand to a specific product. For the industry multiplier, final demand changes are based on all products produced by the specific industry. That is, the industry final demand change recognizes both primary and secondary product production of the particular industry.

Finally, the industry output, labor and proprietor income, and value added multipliers are designated as simple multipliers because they only allow for the interlinkages between the industrial sectors of the economy. Other multipliers can be calculated to allow for the interlinkages between industry sectors and key final demand sectors of the economy such as households and government to impact the size of the multiplier. In the appendix, output, labor and proprietor income, and value added multipliers are calculated including the impact of spending by households, local and central government, enterprises, and the capital account. These total SAM multipliers measure the broad-based impact that final product or industry demand changes have on a regional economy and are larger than the smaller and industry-linkage specific simple multipliers. The desired multiplier to use for a scenario varies depending on the goals of the policy analysis and the nature of the scenario.

Using SAMs for Policy Scenarios

Each of the multipliers provides an indication of the average change in output, income, and value added for a given expansion or decline across the entire BMW economy from a given expansion or contraction of a sector. While these multipliers are intuitively easy to comprehend, they do not typically provide accurate measures of overall impacts on an economy from a given policy or development scenario. The multipliers for a given sector represent the average

multiplier for all local units that are classified as producing products for a specific sector. Any one local unit may purchase a different mix of product inputs as well as a different proportion of local verses non-local products or hire a different proportion of local verses non-local labor, any of which will impact the size of the multiplier. Further, many policy scenarios do not impact any one particular sector, but impact many sectors in an economy. Simple sector-based multipliers do a poor job of estimating total impacts from these multi-sector policy scenarios.

Fortunately, the matrix of multipliers of the BMW SAM provides a relatively simple method for analyzing these more complex policy scenarios. First, a policy scenario is constructed that consists of changes in demand for specific products of the economy. These may include changes in products from industry, changes in income from increased employment or changes in spending from government such as increased household transfer payments or increases in government spending on goods and services. In some more complex policy scenarios, a separate model outside the SAM is used to estimate sector-based changes that can serve as inputs for the multiplier matrix. Once these input estimates are finalized, they are injected into the matrix of multipliers. The output of the matrix is a region-specific sector by sector change in output, income, and value added. The core output from the matrix can then be used to create specific policy scenario multipliers. Hence, regions interested in evaluating multiple policy scenarios can compare them on impacts from a sector-by-sector basis, or a total economy basis using total impacts or multipliers.

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Appendix A1. CSO Data Sources Used for Construction of BMW SAM

Annual Services Inquiry 1999: Retail, Wholesale, Real Estate, Renting, Business and Selected Services. Central Statistics Office. Dublin. March, 2003.

Balance of International Payments: Quarter 3 2002. Central Statistics Office. Dublin. January 2003.

Census of Building and Construction 2000. Central Statistics Office. Dublin. March, 2003.

County Incomes and Regional GDP 2000. Central Statistics Office. Dublin. March, 2003.

Census of Industrial Production, 2000. Central Statistics Office. Dublin. April, 2003.

Household Budget Survey 1999-2000: Final Results. Central Statistics Office. Dublin. October, 2002.

Input-Output Tables 1990. Central Statistics Office. Dublin. February 1997.

National Income and Expenditure 2001. Central Statistics Office. Dublin. December, 2002.

PRODCOM: Product Sales 2000. Central Statistics Office. Dublin. December, 2001.

Trade Statistics December 2002. Central Statistics Office. Dublin. April, 2003.

Appendix A2. BMW Total SAM Multipliers.

CPA / NACE	Description	SAM Industry Multipliers			SAM Product Multipliers		
		Output	Labor & Proprietor Income	Value Added	Output	Labor & Proprietor Income	Value Added
01	Agriculture	2.20	1.82	2.16	2.20	1.82	2.16
02	Forestry	1.78	1.51	1.66	1.78	1.51	1.66
05	Fishing	1.56	2.12	1.72	1.56	2.12	1.72
10-14	Mining	1.68	1.62	1.87	1.68	1.62	1.87
15-16	Manufacture of Food, Beverage, and Tobacco Products	1.70	4.15	2.47	1.70	4.15	2.47
17	Manufacture of textiles	1.91	1.87	2.15	1.91	1.87	2.15
18	Manufacture of Wearing Apparel; Dressing and Dyeing of fur	1.70	1.85	1.90	1.70	1.85	1.90
19	Tanning of Lather; Manufacture of Bags and Footwear	1.87	1.64	2.00	1.87	1.64	2.00
20	Manufacture of Wood Products	2.08	2.39	2.64	2.08	2.39	2.64
21-22	Manufacture of Pulp and Paper Products, Printed and Recorded Media	1.79	2.16	2.33	1.79	2.16	2.33
24	Manufacture of Chemicals and Chemical Products	1.65	2.16	2.09	1.65	2.16	2.09
25	Manufacture of Rubber and Plastic Products	1.90	2.00	2.21	1.90	2.00	2.21
26	Manufacture of other Non-Metallic Mineral Products	1.75	1.95	2.09	1.75	1.95	2.09
27	Manufacture of Basic Metals	1.51	1.89	1.98	1.51	1.89	1.98
28	Manufacture of Fabricated Metal Products	1.67	1.79	1.97	1.67	1.79	1.97
29	Manufacture of Machinery and Equipment	1.68	1.92	1.99	1.68	1.92	1.99
30	Manufacture of Office Machinery and Computers	2.19	4.07	3.41	2.19	4.07	3.41
31	Manufacture of Electrical Machinery	1.75	2.04	2.19	1.75	2.04	2.19
32	Manufacture of Radio, Television and Communication Equipment	1.65	2.37	2.00	1.65	2.37	2.00
33	Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	1.58	1.89	1.81	1.58	1.89	1.81
34-35	Manufacture of Motor vehicles, Semi-trailers, and Other Transport Equipment	1.68	1.61	1.83	1.68	1.61	1.83

CPA / NACE	Description	SAM Industry Multipliers			SAM Product Multipliers		
		Output	Labor & Proprietor Income	Value Added	Output	Labor & Proprietor Income	Value Added
23,36-37,40-41	Manufacture of Petroleum, Furniture, and Other Manufacturing; Electricity, Gas, and Water	1.78	1.85	2.03	1.78	1.85	2.03
45	Construction	1.85	2.00	2.24	1.85	2.00	2.24
50	Sale and Repair of Motor Vehicles and Auto Fuel	1.67	1.45	1.63	1.67	1.45	1.63
51	Wholesale Trade	1.55	1.53	1.59	1.55	1.53	1.59
52	Retail Trade	1.61	1.57	1.64	1.61	1.57	1.64
55	Hotels and Restaurants	1.66	1.59	1.68	1.66	1.59	1.68
60	Land Transport	1.88	1.79	1.68	1.88	1.79	1.68
61-64	Water and Air Transport; Transport Services	1.59	1.50	1.59	1.59	1.50	1.59
65-67	Financial Intermediation	1.60	2.05	2.11	1.60	2.05	2.11
70	Real Estate	1.69	1.27	1.44	1.69	1.27	1.44
71	Renting of Machinery and Equipment	1.51	1.62	1.63	1.51	1.62	1.63
72	Computer Services	1.62	1.39	1.56	1.62	1.39	1.56
73	Research and Development	1.41	1.40	1.42	1.41	1.40	1.42
74	Other Business Activities	1.52	1.46	1.55	1.52	1.46	1.55
75-99	Other Public and Private Services	1.71	1.44	1.64	1.71	1.44	1.64

Institiúid Teicneolaíochta Leitir Ceanainn

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Research Paper

on

"The Potential Impact of the Western Rail Corridor on the Economy of the BMW Region"

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The Potential Impact of the Western Rail Corridor on the Economy of the BMW Region

Introduction

Over the last couple of years, there has been renewed interest from many quarters in reestablishing a North-South rail service in the West of Ireland, from Sligo to Limerick. The Strategic Rail Review (SRR), tabled April 3, 2003 by Booz Allen Hamilton concluded that the Western Rail Corridor was unjustified on the basis of benefits and cost. The SRR estimated the capital cost of implementing the proposal at €572 million with annual operating expenditure of €49 million and annual maintenance costs of €12 million. It also estimated annual revenues of €13 million and other benefits of €73 million

Yet a number of public bodies, political parties and individuals have continued to promote the idea. In June 2003, an advocacy group called West On Track was established and in January 2004 they released the results of their own Western Rail Corridor feasibility study entitled, *Western Rail Corridor: Project Costings and Financial Projections*. The West on Track study showed significantly lower capital costs and much lower operating costs. On May 6, 2004 the Minister of Transport, Mr Séamus Brennan, T.D., appointed an expert working group to examine the potential of the Western Rail Corridor.

The analysis reported here is not a benefit-cost analysis or feasibility study but an economic impact analysis. Using the newly available Border-Midland-Western (BMW) Social Accounting Matrix (SAM), a scenario was constructed based on data from several sources, including the West on Track study. This scenario was then introduced to the BMW SAM to predict the possible impacts of the Western Rail Corridor.

The analysis indicates that the Western Rail Corridor would have significant and positive impacts on the economy of the BMW region. The capital investment in the WRC would stimulate the economy in the short-run (5 years) through the construction sector. As the facility becomes available it would have permanent impacts through the increased movement of people and goods. Certain sectors such as tourism will receive a major boost, as access to consumers will be greatly increased.

The Scenario

Six general kinds of direct changes are likely if the WRC is undertaken. In the short-run, the reconstruction of facilities will directly stimulate the construction sector in the region. A project of this magnitude would require a significant expansion of the capacity of the construction sector, and it is likely that some or many of the firms involved would come from outside the region. However, much of the stimulation from this investment would stay in the BMW region since construction workers would come from the ranks of the locally unemployed, the underemployed and those wishing to take second jobs.

Another short-run stimulus would come from increased investment in the private sector as firms that benefit, or could benefit from the rail service construct new facilities. This is especially true of hotels, restaurants, amusements, and ancillary transportation (taxis and local bus services) related to the tourism sector.

Figure 1 summarizes these temporary (short-run) direct impacts on the economy of the BMW region. The WRC investment and private investment directly impact the construction sector creating higher household income. This combination results in a multiplier effect on the BMW economy. The BMW economy has an impact on external economies through its purchases of imports and payments of taxes back to government.

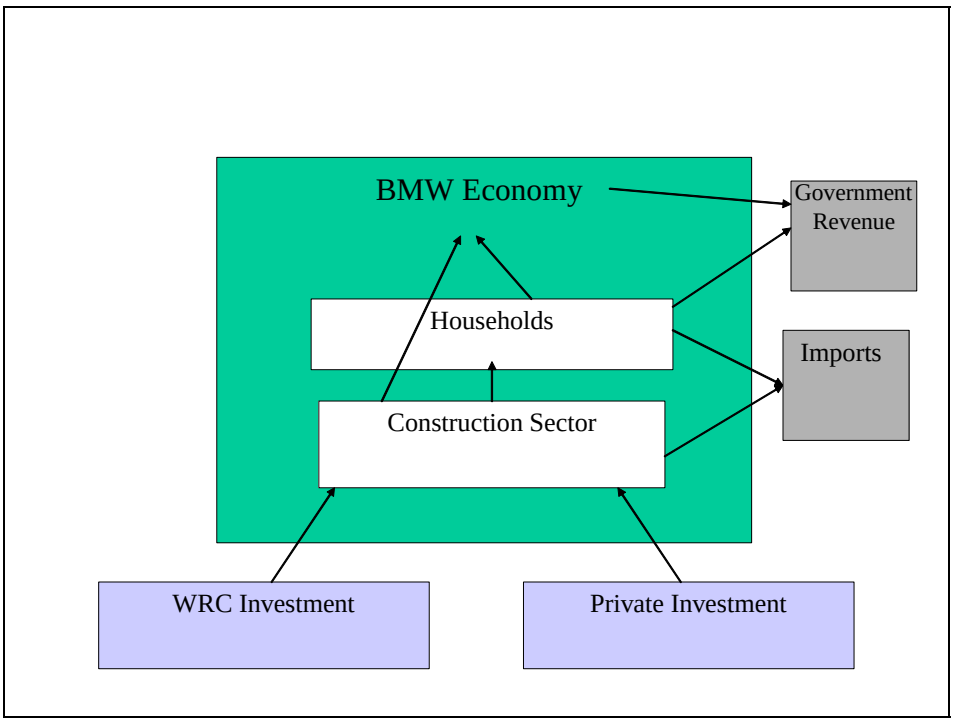

Figure 1: Investment related impacts of the WRC on the BMW Economy

In the longer-run, following the completion of the rail line, expenditures for the operation and maintenance of the facilities would stimulate the economy. This would primarily occur through the increase in permanent jobs but would also involve the local procurement of goods and services. Second, some of the users of the WRC would shift their consumption from other forms of transport (largely autos and buses) to the rail. This would reduce the demand for non-rail transport, at least relative to the levels that would occur in the absence of rail service. Given the recent rapid growth in this sector, and the length of time necessary to build the new rail facilities, this decline would likely not be very noticeable to many enterprises in the sector.

Based on the experience of other localities, rail service of this type attracts new riders. There may be a small number of area residents encouraged to travel more because of the new service but this will have little or no effect on the local economy. The important change would be the new travelers from outside the region—largely tourists—that would not have visited the region were it not for the train service. These new tourists would expand tourism and related sectors throughout the Western Region, but especially north of Galway, thus complementing current policies and efforts of businesses and officials in the region.

Finally, there is a possibility that the improved transportation (both new rail, and somewhat reduced use of highways) would induce an expansion of existing businesses, or the location of new businesses, that have significant transportation needs for either their sales or purchases.

While the difference may not be large, the improved transportation infrastructure will reduce freight costs and make the area potentially more competitive. While it is true that developing economies are increasingly becoming dependent on the service sectors for employment, it is not because consumers use fewer goods. Goods production and distribution continue to grow as the Gross Domestic Product rises. In the United States during the 1990s, for example, employment in the goods producing sectors continued to decline, but freight ton-miles grew by 23%, just slightly less that the growth in the GDP over that period.

Figure 2 shows the permanent impacts of the Western Rail Corridor on the economy of the BMW.

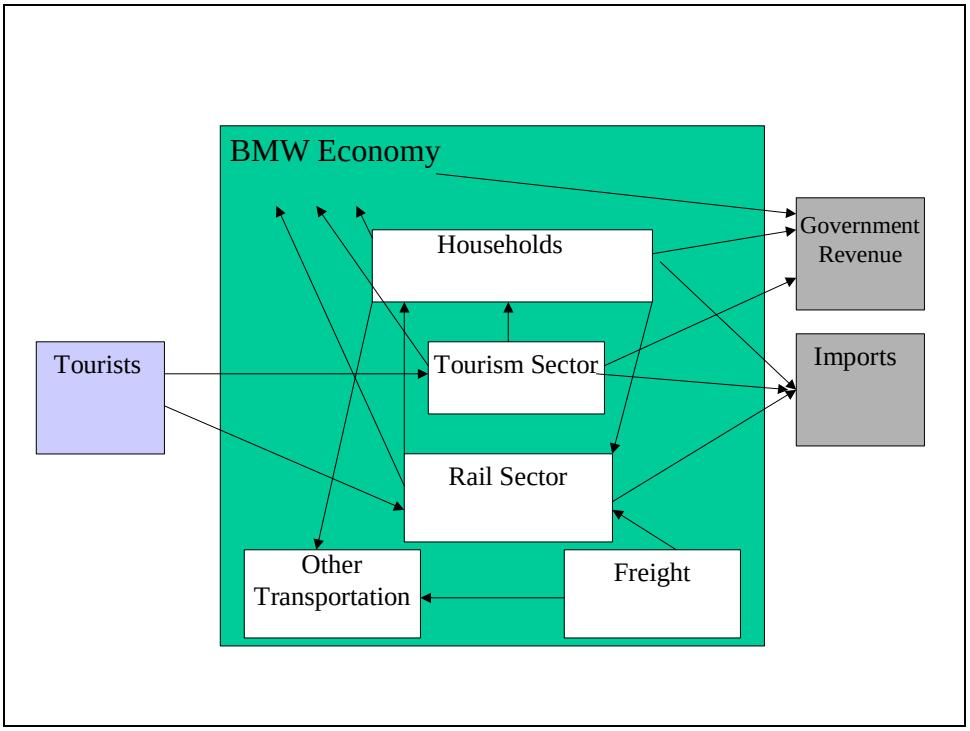

Figure 2: Permanent impacts of the Western Rail Corridor on the BMW Economy

Sources of Data

In order measure the potential impacts of the WRC on the BMW economy, one must estimate the direct impacts, that is the level of WRC investment, private investment, operating and maintenance expenses, new tourism, change in demand for other transport, and new demand for freight transportation. An accurate impact analysis requires accurate data on these direct effects.

Two direct impacts—new private investment, and an increase in manufacturing due to lower transport costs—could not be estimated and are ignored in this analysis. These impacts, while probably smaller than those included in the analysis, are not insignificant. The Enterprise Strategy Group (2004, p. 33) recently concluded that Ireland's international competitiveness is reduced by inadequate infrastructure, because, "…inward investment is diminished, as companies prefer locations with transport and communications links that allow for the efficient and cost-effective movement of goods, people, and information….Inadequate infrastructure leads to increased costs and lower productivity across the enterprise sector." For this reason, this analysis underestimates of the total economic impact of the development of the Western Rail Corridor.

For the other direct impacts, three sources of data were very useful. The feasibility assessment produced by West on Track was the main source of data. From this study we extracted data on capital investments, operating and maintenance expenditures, and numbers of travelers. A second source of data was Failte Ireland. From their *Tourism Fact card, 2003,* we built a simple profile of tourists to the Western region. Finally, we were fortunate to have access to a recent study of Scottish rail passengers by Steer Davies Gleave, which he completed at the request of the Highlands and Islands Enterprise. This study, named *The Case for Rail in the Highlands and Islands* provided very useful information about train passengers in a setting not unlike the West of Ireland. This study provided us with estimates of the potential numbers of new tourists that would visit Western Ireland if the proportion of travelers on the WRC that were new was the same as that proportion in the Highlands and Islands trains were new.

Assumptions

The scenario discussed above was based on the following assumption:

Table 1: Major assumption made as a basis of the WRC scenario

Construction costs [1]	€249,720,000
Annual WRC revenues [1]	€6,250,008
Freight revenues on the WRC [2]	None
Total number of riders on the WRC per year [3]	670,800
% of WRC passengers who are visitors to BMW [4]	62%
% of WRC passengers who will be new travelers [4]	28%
Expenditures per trip by visitors [5]	€277
New expenditures by new tourists in the BMW [6]	€22,276,153
Reduced expenditures on non-rail transportation [7]	€4,821,710

[1] Based on estimates by West On Track.
[2] This assumption was also made by West On Track, despite the high likelihood that there will be some freight revenues.
[3] This estimated is based on West On Track's projected number of daily travelers of 2,150 per day, multiplied by 6 days per week and 52 weeks.
[4] Based on 2003 survey of Highlands and Islands rail patrons.
[5] Based on Failte Ireland estimates of expenditures per tourist in 2003.
[6] Number of new riders was divided by two assuming all visitors purchased return rail trips. Total trips were then multiplied by expenditures per trip of €277.
[7] It was assumed that while the average rider on the WRC was assumed to pay just under €10, the reduced expenditures on other transportation would be €10 per traveler.

The break down of Highlands and Islands riders based on the 2003 survey of its patrons is shown in Figure 3.

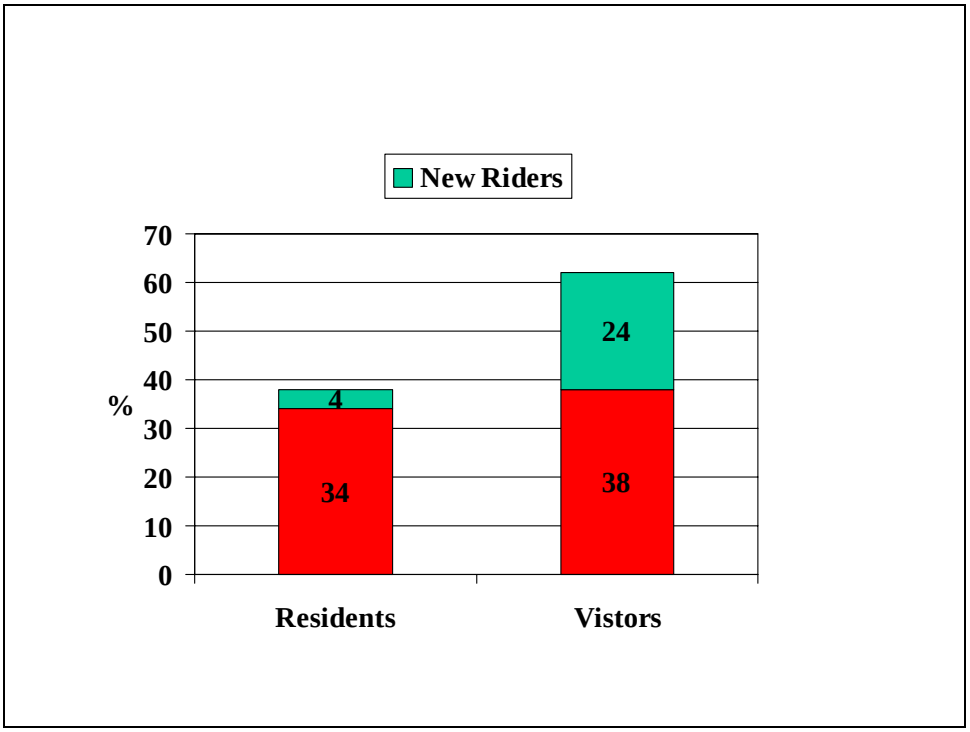

Figure 3: Breakdown of Highlands and Islands ridership on Scottish trains in 2003.

Results of Analysis

The assumptions above were introduced to the BMW Social Accounting Matrix. Four different component impacts were calculated. First, the capital expenditures of €249,720,000 were introduced to the BMW construction sector. The sector accounts for average regional purchase patterns; that is, there are normal leakages in the sector. Some portion of all construction demand is satisfied by firms from outside the region. However, since this project is relatively large and specialized, it is possible that this normal leakage under estimates the amount of expenditures that would leak out of the BMW economy. On the other hand, the over estimation is likely to be small since most of the impacts will occur because of the labor components which will be overwhelmingly local.

The results of this construction phase are shown in Figure 4. The flow diagram summarizes the impacts indicated by the SAM, which calculated the detailed, sector by sector impacts. The model predicts that over the period of construction, which is expected to be about 5 years, total economic activity in the BMW (sum of sector sales) will increase by €462,672,000. Of this amount, about €150,022,000 will be new household income for BMW residents, and the increase in Gross Domestic Product in the region will be €177,539,000. This of course assumes that other government expenditures in the region are not reduced because of this new project. If construction

expenditures on highways are reduced by a similar amount, then the net impacts would be approximately zero.

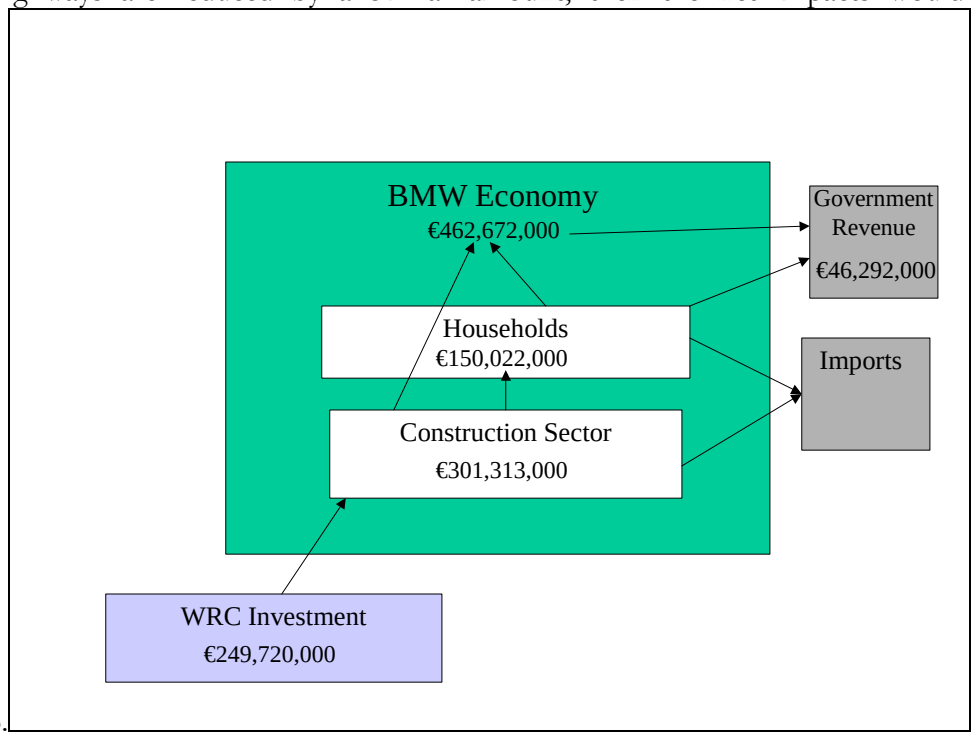

Figure 4: Construction related impacts of the Western Rail Corridor

The permanent results of the project are shown in Figure 5. These impacts include three components—operating and maintenance, new tourism, and reduced expenditures on other transportation. The analysis finds that the rail sector increases sales by €6,250,000 more than offsetting the decline in non-rail transportation of €4,822,000. Tourism increases sales directly by €22,276,000. Together, these changes lead to total annual changes of €31,156,000 in total economic activity, €11,181,000 in new household income in the region, and an €15,905,000 increase in GDP. These total changes reflect both the direct and indirect spending effects projected by the BMW Social Accounting Matrix.

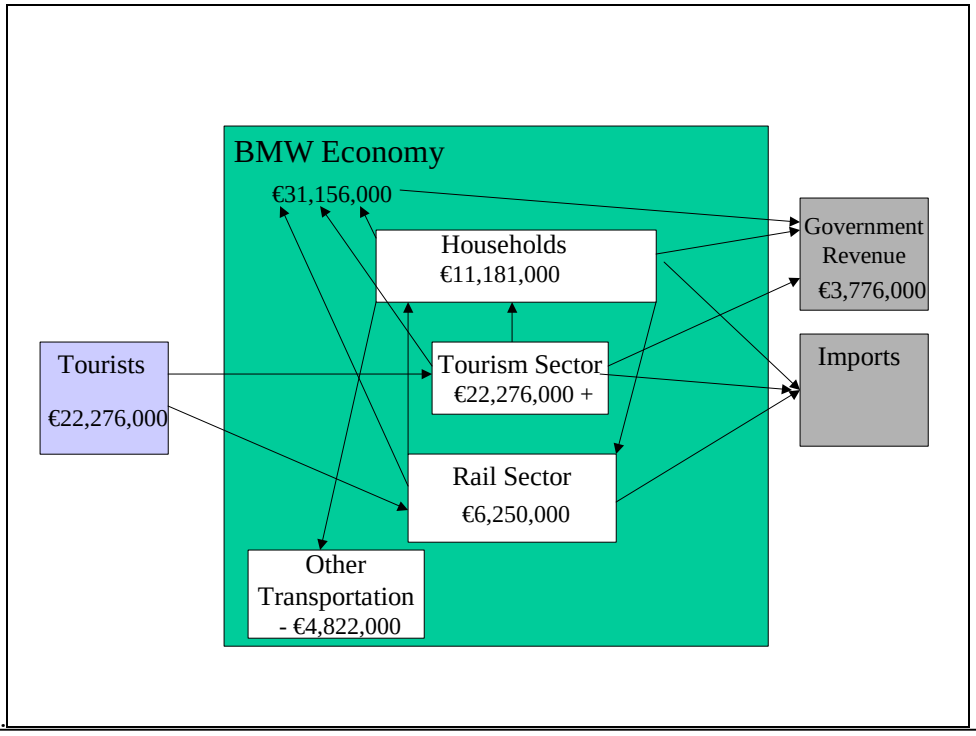

Figure 5: Annual Post-Construction Impacts of the WRC on the BMW Economy

As indicated, the BMW SAM generates a large amount of detail about the impacts on the regional economy. It shows change in sales, wage income, proprietors income, taxes, and GDP in each sector. Some of the highlights from this scenario are shown in Table 2.

Table 2: Permanent Impacts of the WRC on Various Sectors of the BMW economy

Sector	Impact
Construction	€1,913,000
Retail sales margins	€5,644,000
Hotels and restaurants	€11,603,000
Land transport	€6,458,000
Automobile repair and fuel	- €4,645,000
Tax revenues	€3,776,000

It is important to point out that this scenario excluded certain impacts either because data were not available, or because the model was not designed to estimate them. First, as indicated above, increases in private sector investments, especially in the hotel and restaurant sectors were ignored. Since the tourism industry has experienced a significant decline since the terrorist attacks in the United States in September 2001, there is probably some excess capacity at this time. However, at some time in the future, the boost in tourism created by the project would lead to some additional private sector investment.

Second the scenario ignored the possibility of rail freight on this line. It is likely that some rail freight would arise. It is important to point out that this would also increase the freight on existing lines, since shippers that would otherwise ship by truck the entire distance from the vendor, or the port, would now be able to ship by rail all the way. It is important to point out that even if rail freight is used very little, the existence of rail as an alternative creates competitive pressure on other transport modes.

Third, we were unable to determine the likelihood that new manufacturing facilities would locate along the WRC. This may be a relatively small effect but it is not impossible that lower and more convenient transportation in the region would either allow existing manufactures to expand or new manufacturers to locate in the region. This is certainly the conclusion of the Enterprise Strategy Group (2004) Finally, one of the important benefits of a rail corridor would be that highway traffic would be reduced somewhat. This would reduce auto accidents, property damage, and delays.

Conclusions

This study was not a benefit-cost analysis. A sound benefit –cost analysis would compare the benefits of increased traffic safety, reduced congestion costs, environmental improvement, reduced fuel consumption, and reduced transit times, versus the costs of reconstructing the line. This study does find that even while increasing tourism in the West of Ireland, the number of automobiles on the road would decline, at least temporarily reducing congestion, accidents, fuel consumption and transit times.

Nor was this analysis a feasibility study. A feasibility study would compare expenditures versus revenues of operating the WRC. It is important to note that unless the facility is to be a private venture, a feasibility study should not be the basis of a decision on a project's merits. Simple feasibility studies ignore the fact that some sort of transportation is necessary for any economy to function. A simple feasibility study of a non-toll highway, for example, would always show a negative cash flow since revenues would be zero.

The study reported in this paper is an impact analysis. It predicted the economic consequences of the WRC for the BMW region. It shows the sectors that will benefit and those which will be disadvantaged by the WRC. It measures the change in important indicators such as income, GDP and tax revenues. It provides information that will allow both public and private actors in the region to plan for the future transportation and public infrastructure needs of the region..

This analysis doesn't guarantee that investment in the WRC is the best use of the public funds involved, since other alternatives would have to be analyzed and compared. However, this analysis does show that the project would bring significant economic benefits to the BMW region. The economy of this traditionally underdeveloped region would be stimulated as called for by the National Spatial Strategy and would contribute significantly to the Irish Government's objective of a "balanced regional development" as contained in the National Development Plan 2000-2006. In this sense the project would benefit all of Ireland.

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APPENDIX 4: Approaches to modelling regional economies in order to develop better public policy: A Comparative study of Ireland, Scotland, Finland and Denmark.

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Introduction:

A standard definition of public policy views it as an "action which employs governmental authority to commit resources in support of a preferred value" (Considine 1994). Public 'economic' policy questions usually involve the analysis of the cost and the re-distributional impacts of changes in policy - what are the costs (or savings) to government versus the community? Who are the winners and who are the losers? Economic models particularly Social Accounting Matrices can be used to examine the nature of policy and the detailed effects of structural changes.

Creating Good Public Policy:

Policy makers and the public widely subscribe to a view that policy making should be well informed - if not, then it will be merely 'political' (Keane 2004) this statement highlights the inherit stumbling block in policy formulation. The ideal of evidence based policy is often unmatched by the provision of resources to collect such evidence. This paper describes four approaches to regional data collection which using a SAM template offer the potential for evidence based regional policy. The need for change in the ways in which government policy is made - fuelled by Government's insistence that policies deliver better public service - is widely acknowledged in the policy making community. But the picture is not straightforward. The issues facing today's policy makers are complex and often unpredictable - they can switch swiftly from the domestic to the international agenda, and they must harness diverse interests and work with rising expectations. Policy makers must be in touch with the effects of policy, and understand the context in which the policy has to be implemented.

Using Economic models in policy formulation:

There are two main reasons why economists construct regional models. First large organizations need forecasts of demand of their output over extended periods with regional forecasts playing a critical role in investment planning. Secondly regional models can be constructed to estimate the impacts of new investment.

An economic model can be viewed as a mathematical representation of the quantitative relationships between economic variables. At the macro level its equations compromise technical relations and accounting identities that reflect the national income accounting framework and behavioral equations that describe the aggregate actions of consumers, producers, investors, financial institutions etc. In its largest and most complex state a model is simultaneous, dynamic and nonlinear and may involve thousands of relationships and huge financial expenditures in its construction and maintenance (Klein and Young 1980).

Social modeling is quite simply the representation of social phenomena and or the simulation of social processes. While there are potentially an endless amount of social models they can be classified by the following characteristics.

Fig 1: Types of Social Models: Browne & Harding 2002

Simple	Complex
Small	Large
Qualitative	Quantitative
Static	Dynamic
Deterministic	Stochastic
non-behavioral	Behavioral
non-spatial	Spatial

The marriage of Economic and social modeling techniques allows for a greater level of detail to be included in forecasts and scenarios. Such developments have generated renewed creditability in the use of models in policy formulation.

Using Social Accounting Matrix (SAMs):

Most countries are now facing the need to examine the links between economic and social development and a SAM offers the necessary tool for establishing such links. At the very heart of regional modeling is the concept of internal feed-back through input-output linkages between economic agents such as firms and households with linkages occurring through the supply and consumption of goods and services.

SAMs describe the many economic flows among sectors of a regional economy, and between the region and the rest of the world. Changes in activity in one sector, say agriculture, are traced through all other sectors, including the public sectors, to calculate total sectoral income, employment, tax revenues, and trade. The tables in excel form are very large and somewhat difficult to interpret but the real focus is on understanding the output from the model. The output comes in the form of multipliers[?] which are used to create scenarios[?]. The level of confidence which can be place in the results of these scenarios will depend on many issues such as:

- The level of co-operation from the national statistic body.
- The ease with which the required data sets can be regionalized.
- The level of detail/sectors that can be created.
- Access to subsequent data in order to create the scenario

A suitably designed SAM should provide information on how and the degree to which different groups in society interact. There are three main benefits in constructing a SAM. First their construction requires a significant degree of detailed estimation and the use of data sets in a way that has not been utilized before. Secondly they are a very good way of displaying information; the structural interdependence at both the macro and meso levels are shown in a SAM in a simple and illuminating way. Thirdly they represent a useful analytical framework for modeling.

[?] The multiplier principle is that a change in the level of injections (or withdrawals) brings about a relatively greater change in the level of the BMW's income.

[?] A scenario is created involving a change in investment in the region across one or more sectors. The monetary change is inputted into the model and via the multipliers results in a change in the main economic indicators of each sector and the economy as a whole.

One of the limitations of SAMs is their huge data requirements, as in order to build them, it is necessary to have access to large volumes of data on the macro and micro economy. Sources of data can be both primary and secondary and in some cases participatory action research can be used to collect data at the local level. Generally they require a large amount of statistical data, but in cases where certain data is missing, it can be possible to reduce the scope of the SAM through some data aggregation and alternative sources of data (Allen 1998). One limitation to using a variety of sources of data is that they may cover different time periods and spatial zones. The European Statistics agency (ESA) have developed a detailed protocol for this work and the application of there techniques and rules gives added creditability to regional models.

Developing a SAM for the BMW Region – Challenges and Opportunities

The specific target of the BMW SAM project was to develop a regional policy analysis tool, which could deliver "on the ground" capacity for decision makers and stakeholders within the Border-Midland-Western BMW region. The leadership of the (BMW) Region of Ireland faces many complicated policy choices as it endeavors to stimulate sustainable economic development. The BMW SAM will be used to compare the benefits, costs and impacts of alternative regional policies and to show how specific measures work in the region. The first such attempt is the Western Rail Corridor scenario.

Policy makers and researchers had virtually no access to reliable statistics on the regional economy of the BMW. Only broad economic indicators were available, offering crude incites into economic performance. A critical element of the overall process was to ensure harmonization of survey sectors from the various business and household surveys into the NACE sectoral classification outlined in ESA 1995. Concordance tables were constructed so that data from Irish statistical publications could be converted to the NACE rev 1 classification. Data was grouped into 60 sectors as per NACE rev. 1[?] [01 Agriculture – 99 other services]. For confidentiality reasons this number was reduced to 36.

Western Isles Economy - Modeling a regional economy

1 This study was undertaken during most of 1999 for Comhairle Nan Eilean Siar in collaboration with Western Isles Enterprise, Highlands and Islands Enterprise and The Royal Bank of Scotland (together, the sponsors). A previous I-O study of the Western Isles by the Fraser of Allander Institute involved a combination of household, industry and organisational surveys and the construction of a 19-sector I-O table for 1988-89 with 7 categories of final demand and 2 primary inputs. The project used detail surveys to collect their data and generate a twenty six sector SAM. This SAM is being used to produce a set of five miniature scenarios which will be used to strengthen policy submissions.

Finland – Developing a resource for regional analysis.

Interregional input-output study was launched at Statistics Finland in June 1997. The aim was to construct interregional input-output tables that can be applied in many circumstances and by anyone who is interested in regional economic analysis using such tables. It hoped that the table will form the basis for more developed regional economic models in Finland. These could be input-output econometric models for studying the regional effects of different developments

[?] NACE REV.1 (STATISTICAL CLASSIFICATION OF ECONOMIC ACTIVITIES IN THE EUROPEAN COMMUNITY)

and policy alternatives, or sophisticated models for regional forecasting. A further aim is to try to make the compilation and updating of multiregional tables a part of regular work in Statistics Finland. Data for this project was generated by regionalising existing national data sets and using survey techniques to measure trade between the regions. The result is a forty four sector I-O systems which it is aimed to develop into a SAM once a system for collecting regional data has be set up.

Denmark – Developing regional data sets using SAM principles.

Regional analysis and economic modelling in Denmark have to a great extent been based on Regional-National Accounts. The first steps were taken by the Institute for Border Region Research in Aabenraa (Smith 1982) where the first set of regional accounts was constructed which was used to build a regional economic model, SØREN. The regional accounts had to be estimated with various types of statistical techniques using national material obtained from Statistics Denmark. Statistics Denmark had at that time only limited and ad hoc regional data. Since 1996 an expanded set of National Accounts are being developed for each of the 275 municipalities in Denmark, using SAM principles. This work is being undertaken in close cooperation between the Institute of Local Government studies (AKF) and Statistics Denmark.

Comparisons:

Fig 2:

	BMW	**Scotland**	**Finland**	**Denmark**
History	Show Me	1998 - 19 sectors	First Effort	Regional accounts 1970
Working Group	Partnership	Partnership	Statistics Finland	AKF & Statistics Denmark
Data Sets	National Data	Survey	National Data & Surveys	Regional Statistics
No. of Sectors	36	26	44	27/131
Year	2000	1997	1995	1995
Level	Nuts 2	Western Isles	Nuts 3 (20 Regions)	Nut 3 - municipalities
Classification	Nace Rev 1	SIC92	Tol 95	SNA 68
Future	Scenarios	Scenario Dev	Quality of data	Enhanced data collection

In order to compare the four models I will discuss the various approaches using the headings in figure 2. It is interesting to note that only Denmark has any sort of tradition of collecting statistics at a regional level. Despite the limited supply of statistics they have been able to develop over thirty years of experience in regional accounting. They current development strategy is focused on enhancing data collection to enable more detailed classification of linkages at the level of municipalities. In the case of Finland and Ireland national data sets had to disaggregated to a regional level. In many cases this is not straight forward and involves a certain amount of estimation to fill gaps that might appear.

The Scottish project by virtue of the time available to it and the relatively small size of its population was able to complete extensive surveys of households, business and other institutions in the Western Isles. This greatly increases the time involved but allowed the project team to control the nature of the data collection thus speeding up the construction process. Another consideration is the impact that the involvement of the national statistics agency has on the project. With the exception of the Western Isles project all the other partnerships include the relevant national statistics body which has proven crucial in terms of generating the best possible data. As the most recent project the BMW teams have used the NACE Rev 1 classification system thus keeping their tables consistent with the ESA standards.

In terms of output both the Finnish and Danish projects are focused on enhancing the level of detail in their data sets and the level of aggregation available. Given the nature of the Scottish and Irish regions current work plans are the building and testing of various policy scenarios i.e. the WRC in Ireland and changes in shipping cost in Scotland. The initial regional modelling was done to enable evidence based policy to be formulated adding strength to lobbying for investment in the regions.

This paper is currently a work in progress and it is hoped to develop a system for comparing the four projects under the following headings:

- Data Collection
- Methodology
- Applications

The completed work will be presented at the ICRPS summer school in Brussels in July 2004.

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APPENDIX 5: Regional Policy Evaluation and Appraisal

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Paper presented at a seminar on Social Accounting for the BMW Region, Letterkenny Institute of Technology, September 6th 2004.

Introduction.

' to do better we must have a way of distinguishing better from worse'

Rivlin, A. 1970. *Systematic Thinking for Social Action*. Washington: Brookings Institute

Policy makers and the public widely subscribe to a view that policy making should be well informed - if not, then it will be merely 'political'. The new term 'evidence based policy' is used to refer to such a desirable practice. However, in the area of regional and urban policy we really have only a rhetorical commitment to this notion. The lack of good regional data for Ireland and our lack of understanding about the underlying spatial economic model means that we cannot answer too many questions with rigour or with precision. Consequently, all existing evidence about how well, or poorly, regional policies work must be, at best, tentative. These difficulties are acknowledged in the recent *Mid-Term Evaluation of the NDP and Community Support Framework for Ireland 200 to 2006* (p. 72) where, when it comes to the regional level, the situation is described as one where ' that policy makers seldom have access to accumulated research on the macro-economic and macro-sectoral performance at a regional NUTS 11 or NUTS 111 level, which would allow them to assess the overall impact of Policy Measures'. In the mid-term evaluation regional issues are addressed first by outlining the major development of the key socio-economic variables and second, in order to provide a framework to analyse the impact of the NDP on regional development, the relevant theoretical developments in the economic literature are reviewed. Theories are helpful to policy practice because they provide a useful frame of reference and a process for bringing some new perspectives into existence (Keane, 1997). Theories are useful as tools of reading, thinking, seeing, inspiring and acting. For example, the role of theory in relation to process, as seen by Forester (1989, p. 64), is ' to direct the attention of the decision maker, to suggest what important and significant actors and events and signals to be alert to, to look for, to take as tips or warnings.' Perhaps the best known example of theory in this context is the concept of market failures. This is a familiar and long-established perspective from microeconomics that is widely used to guide public policy decisions and policy design. McVitee and Swales (2003) make the point that most of our traditional regional policy instruments are, in fact, based around very basic, established, economic theory. The market failure argument has been used to underpin the evaluation methodology used in the recent Mid-Term Review of the NDP. An earlier example of the market failure framework applied to local economic development can be found in Keane (1992). While theory is exciting and gives the user a kind of moral high ground, there is, however, rarely a consensus as to what is the appropriate theory that should underpin the operation of regional policy.

The 'scientific model' for policy evaluation is shown in Figure 1. Box 1 in Figure 1 begins with the citizens. Citizens' preferences over different economic states are represented by a social welfare function in Box 2. The government, Box 3, is described as the citizens' agent. A set of policy instruments, Box 4, e.g. tax/subsidy rates, infrastructure investment, physical or financial controls etc., are available to government. In Box 5 are the exogenous, non-policy variables, the contingent conditions which mediate the link between policy interventions and the target variables q. Box 6 uses theory to describe the true relationship between p, n and q. We can think of theory here as a mechanism for understanding the causal relationship between the policy instruments and the target variables (McVitee and Swales, 2003). This link is operationalised via a parameterised model. The target variables, q, are in Box 7. These are the variables that we are trying to affect with our policies e.g. local employment levels, productivity, income levels etc. Box 8 shows the role of evaluation in the policy model. The function of evaluation is to collect information and then send a signal to the government. In Figure 1 information is represented by dotted lines, actions by solid lines and signals by double lines.

This policy model is made complicated by a number of issues. Two major information issues, in particular, beset regional policy evaluation (McVittee and Swales, 2003). These are schematically illustrated in Figure 2 which amends the representation of the evaluation process given in Figure 1. The first issue is an agency problem and surrounds the identification and articulation of the Social Welfare Function. This is represented in Box A which incorporates Boxes 1 and 2 for the citizens and government. The second issue is the competing set of weakly specified theories in Box 6. The

first issue, that of agency, I will deal with only briefly. A full discussion on both issues can be found in McVitee and Swales (2003). The agency problem is basically about the vagueness in specifying the Social Welfare Function. All governments typically have been very vague in spelling out their policy goals and, particularly, the weights attached to the individual elements making up their regional objectives. This helps to avoid undue criticism and can help to build majority support for a particular policy. As McVitee and Swales (2003) suggest this might be particularly important for spatial policy where it is likely that there will be spatial losers as well as winners following any particular policy and where these spatial groups will be relatively easy to organise and activate. Box A in Figure 2 represents a stylised depiction of the political process, where there are different interests, different perceptions and moral hazard problems. These features can muddy the waters for the practice of evaluation. The dangers come when (a) the government attempts to write the research questions for the academics and the consultants, (b) implicitly asserts that its own perception of policy concerns are necessarily those of the population as a whole and (c) finances evaluation reports that are not freely available to the public

Taking a less positivist position one could also argue that, at the end of the day, evaluation is not a purely objective process. Also, its lessons need to be learned if it is to have an impact. Therefore the best way to secure this impact is to ensure that evaluation reports are freely and widely available. This will guarantee that the assumptions and interpretations will be open to professional scrutiny, critical understanding of the arguments and debate and will limit the scope for self-interested lobbying. Evaluation should play a role in the democratic process – the process of policy choice and scrutiny of the government.

The second problem highlighted in Box 6 Figure 2 is that there is no consensus over the appropriate theory that underpins the operation of regional policy and, certainly in Ireland, there is absolutely no parameterised model of any description. The SAM project, which is the main focus of the seminar today is an important step at redressing the undeveloped state of empirical regional models in Ireland.. Any empirical work on regional data potentially benefits appraisal and evaluation performance if it improves information about the operation of regional economies. The SAM project marks a huge step forward in our empirical knowledge of the operation of the BMW economy

The Evaluation Continuum

Evaluation can be looked at as a continuum, moving from the simplest form of evaluation, monitoring daily tasks, to the more complex, assessing impact on the problem (Bartik and Bingham, 1997). Such a continuum is illustrated in Figure 3. Each of the six points shown on the continuum represents a

Figure 3. The Continuum of Evaluation

Process Evaluation				**Outcome Evaluation**	
Monitoring Daily Tasks	**Assessing programme Activities**	**Enumerating Outcomes**	**Measuring Effectiveness**	**Costs and Benefits**	**Assessing Impacts on the Problem**

Source: Figure 10.1 Bartik and Bingham (1997)

different level of evaluation, with each level building on the previous one. These evaluation activities take place in roughly the same sequence as the implementation of the programme. First, tasks are monitored; then activities are assessed, outcomes are enumerated and the effectiveness of programmes is measured; and, finally, a judgement is made as to whether the problem has been reduced. The lower levels of evaluation activity are best at providing information about how a programme can be improved. The higher level evaluation techniques determine if a program works (does it actually create employment). This partly explains the policymakers' proclivity for process evaluation.

This continuum provides a framework for assessing the quality of evaluations that have been conducted on regional development policies and programmes. I will make just two points. The first, is that if we are to 'prove' that a program accomplishes its goals, then the evaluation must be at the highest two levels of evaluation, measuring effectiveness or assessing impact, with CBA thrown in for good measure as an efficiency test. Simply enumerating outcomes is not sufficient. The second point, following this continuum, is that practically all of evaluation work done on regional or local economic development programmes in Ireland has been primarily about monitoring provision.

Some Questions and Answers in Regional Policy Evaluation, The Rural Renewal Tax Scheme

This section of the paper uses evidence on the effectiveness of the Rural Renewal Tax Scheme (RRTS) to highlight some evaluation issues and questions. The RRTS has very much followed on from the urban schemes which were first introduced in the mid. 1980s. The scheme is a 'pilot' initiative of rural renewal aimed at invigorating the Upper Shannon region and covers all of the counties of Leitrim and Longford as well as some areas in counties Cavan, Roscommon and Sligo. Significant resources have been expended on all of these schemes with little or no evaluation of outcomes. Not surprisingly, the advocates of tax incentive schemes usually seek to link these incentives and the projects that follow from these incentives to meritorious goals like urban revitalisation and local economic development. Thus, one local authority manger has recently described the RRTS as "a marvellous stimulus for growth" in his area (Sunday Tribune, 06.10.02). Is he correct? What about the costs of these schemes to the taxpayer, in terms of tax expenditures. The Office of the Revenue Commissioners is the main source of information or data on the cost of tax incentives/expenditures (TSG, 2002). There are only limited estimates available. The most recent data in the RRTS is reported in a Department of Finance memo which discusses the political pressure to extend the area and timescale of the rural renewal scheme. This memo warns that ' even confined to current areas, an extension is expected to cost the state an additional €30 million a year' This estimate is bound to be tentative, given the technical difficulties acknowledged by the Revenue in arriving at any cost figures for any of the tax relief schemes (TSG, 2002). Taking the estimate of €30 million as a cost does the RRTS pass an efficiency (CBA) test? i.e. does the scheme generate a greater value of societal benefits than it costs. How might we answer these different questions?

If we look for some economic theory to give us a frame or a fix on these questions we might apply the indifference principle which warns about what to expect by way of societal benefits from any policies that are designed around location, land or site development. These policies by definition are unlikely to generate broad social benefits because the benefits end up capitalised in the pockets of the owners (who are probably not needy) of these fixed resources. If we are not satisfied with some theoretical argument we will want to see some factual evidence of societal benefits. The rationale for the RRTS puts the emphasis on new economic activity and economic growth in the designated areas. Thus, it is legitimate, from a societal perspective, to look, perhaps, for positive employment impacts in the area as the key outcome from the scheme. After all, the type of evaluation of local economic development that is most needed are estimates of the impacts of the policies on desirable local economic outcomes. The key question here, or in any evaluation, is the counterfactual, what would have happened to employment/unemployment in the designated area if the RRTS had not been introduced. The ideal experiment that would answer this question would be to take the designated area when the scheme was introduced, observe what happens throughout the life of the scheme and then go back in time to the same starting date and observe the same area with no tax scheme. Obviously, it is impossible to do this kind of experiment but it encourages us to think about the kind of design that is needed for proper of policies of this sort (Boarnet, 2001, Courant, 1994, Papke, 1994).

Boarnet (2001) reviews this literature and makes three important points about a good tax–zone evaluation. First, the evaluation must be able to provide convincing evidence that the effects attributed to the area are in fact due to the tax policies and not to other factors. Economic fluctuations, local economic conditions, unique local characteristics and, indeed, the manner in which areas are selected can all produce economic impacts that might be confounded with the policy outcomes that the evaluator is trying to measure. Second, to the extent that it is possible to approximate the methods used in classic experiments, like clinical drug trials, tax designated area evaluations will be more convincing. Finally, a crucial aspect of control group research is the existence of the control group itself. How would we know if a drug worked if we did not compare test subjects to persons who did not take the drug? We must have an evaluation method that can systematically compare the tax designated area with areas that did not get the benefits of tax designation. The elements that are needed for a robust evaluation can be provide by a variety of well developed statistical techniques which involve fixed effect regression methods and year dummy variables. These methods were used to look for positive employment effects as the primary outcome of the RRTS. Local employment gains were measured with the Live Register data. Full details of the methodology used can be found in (Keane and Garvey, 2003).

The results of the evaluation are summarised in Chart 1. It can be seen from the diagram that, from about month 27 onwards, unemployment is on average around 12% less in the scheme area than in the rest of the BMW region, controlling for all the other possible sources of variation. This is equivalent to about 600 people per month or almost 10,500 person months in total up to the end of our data period. In Chart 1 there is some evidence of a slight tapering off of the effect towards the end of the time period of our study. Coefficients, for example, become slightly smaller. We cannot, of course, be sure that this tapering off will have continued past the terminal month of our study. Also, the reasons for its existence are uncertain. It may be due either to general equilibrium effects (unemployed people moving into the area) or due to the possibility that the scheme may be more (or perhaps less) effective when the broader trend is for falling unemployment rather than when, as in the last months of out study, the broader trend is for rising unemployment. Further data and further investigation of the time series properties of the data are certainly needed to reach acceptable conclusions on these issues. What does not seem in doubt, if our methodology is accepted, is that there have been clear and sizeable positive employment effects, whether temporary or not, and that these positive effects can most convincingly be ascribed to the introduction of the RRTS.

However, because the scheme has been shown to be substantially effective – that is, it actually created employment – does not mean that the scheme should ever have been implemented. CBA (cost benefit analysis) allows one to determine if the programme benefits outweigh the program costs. The CBA appraisal is summarised in Table 1. The costs is the tax expenditure estimate provided by the Department of Finance. The employment benefits have been econometrically estimated at approximately 600 jobs per month. If we assume that these employment gains are realised over the period 2001 – 2004, then we can estimate the annual benefits of this employment as 600 multiplied by the annual average unskilled wage in construction. This yields a figure of €16.2 million annually. However the market wage must be replaced with a shadow wage that reflects the opportunity cost of

Table 1. CBA of the Rural renewal Tax Scheme, Summary Table

Costs (tax expenditures)	**Benefits (value of the employment)**
€30 million p.a.	**€1.6 million p.a.**

labour. In the CBA system used to evaluate industrial projects (Honohan, 1998), the economic gain from reducing unemployment is captured by setting the shadow wage equal to 80% of the market wage, that is treating 20% of a project's wage bill as a net economic gain. In a fully employed economy, the market wage reflects the opportunity cost of labour and is the same as the shadow wage. The authors of a recent Forfas (n.d.) manual on an economic appraisal system for project seeking support from the industrial development agencies have argued that a higher shadow wage is now more appropriate than the 20% rule. They make the case that the shadow wage should be set equal to the market wage and that this should be the new benchmark for the Dublin region and other locations that are deemed to be at full employment. However, they concede that the evidence on regional imbalances in labour market conditions warrants a regional differentiation of the shadow wage. Their reference shadow wages are: Dublin = 1, Rest of Ireland = 0.95 and BMW = .90. This implies that the social benefits attributable to a project should vary from 0% of its wage bill in Dublin to 10% in the BMW region. This would give a lower bound estimate of the annual benefits estimate for the RRTS of €1.62m which can be matched against an estimate of its cost. It can be argued that the kind of areas that are designated for the tax scheme are likely to be characterised by much lower opportunity costs at all levels of employment as there will be few alternatives short of welfare benefits and unemployment pay (Felsenstein, 2001). Regardless of how generous the assumptions one makes about shadow wages, or the tentative nature of the Department of Finance's costs, it is quite clear that the RRTS is a very poor policy tool from an economic point of view.

Conclusions

It might be argued that the analysis set out above is unfair to the rural areas in question. That it doesn't, for example, count the benefits that are generated by secondary market effects and by local multiplier impacts. The standard view in CBA is that local benefits are generally viewed as transfers from other areas rather than real benefits (Boardman et al. 2001). It is only when secondary markets are distorted that effects in these markets can potentially generate important benefits for the community. The analysis of indirect effect does become more interesting, and, perhaps, more complicated, in the presence of potential allocative externalities (also called spillover benefits and agglomeration effects)

associated with the tax scheme. These positive externalities may arise when the tax designated area reaches a critical mass or agglomeration in terms of the nature, depth and breath of its economic activity. These effects may be partially attributable to the tax scheme and, if so, then it is legitimate to treat part of the local development benefits as real benefits. My only argument for now in relation to some of these dynamic effects is that, if they are present, they should also be picked up in the employment numbers.

We have a long way to go if we want to pursue the practice of 'evidence based policy' in the regional and local development sphere. We are all strong supporters of the 'local' and of place focussed policies. This is natural in a democratic society and place policies are inevitable. After all, all regional policy issues must eventually be reduced to the specific programmatic questions of the priority and location of activities. What we need to do is avoid overselling them, calculate their costs accurately, and try to curb their worst excesses. It is not good enough to adopt simple mantras about policies being good without testing whether the perceived gains in question outweigh the perceived costs either in terms of local sustainability or social cost benefit analysis. Better regional and local data and more research into understanding spatial processes and interactions are required.

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Chart 1: Estimated Monthly Reduction in Live Register due to Scheme in the 6 Test Offices (Heteroskedastistic Office Specific AR1 Procedure; FGLS(3) Results from Table 1)

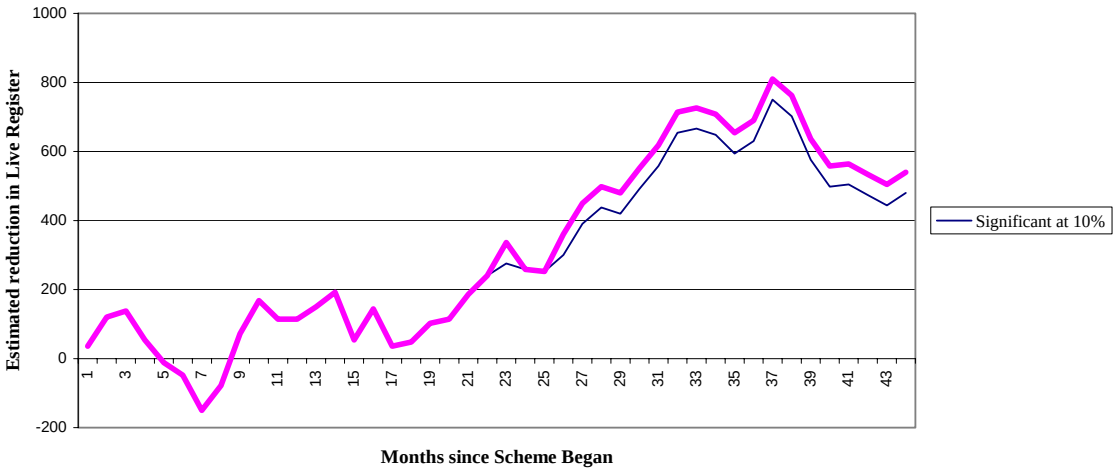
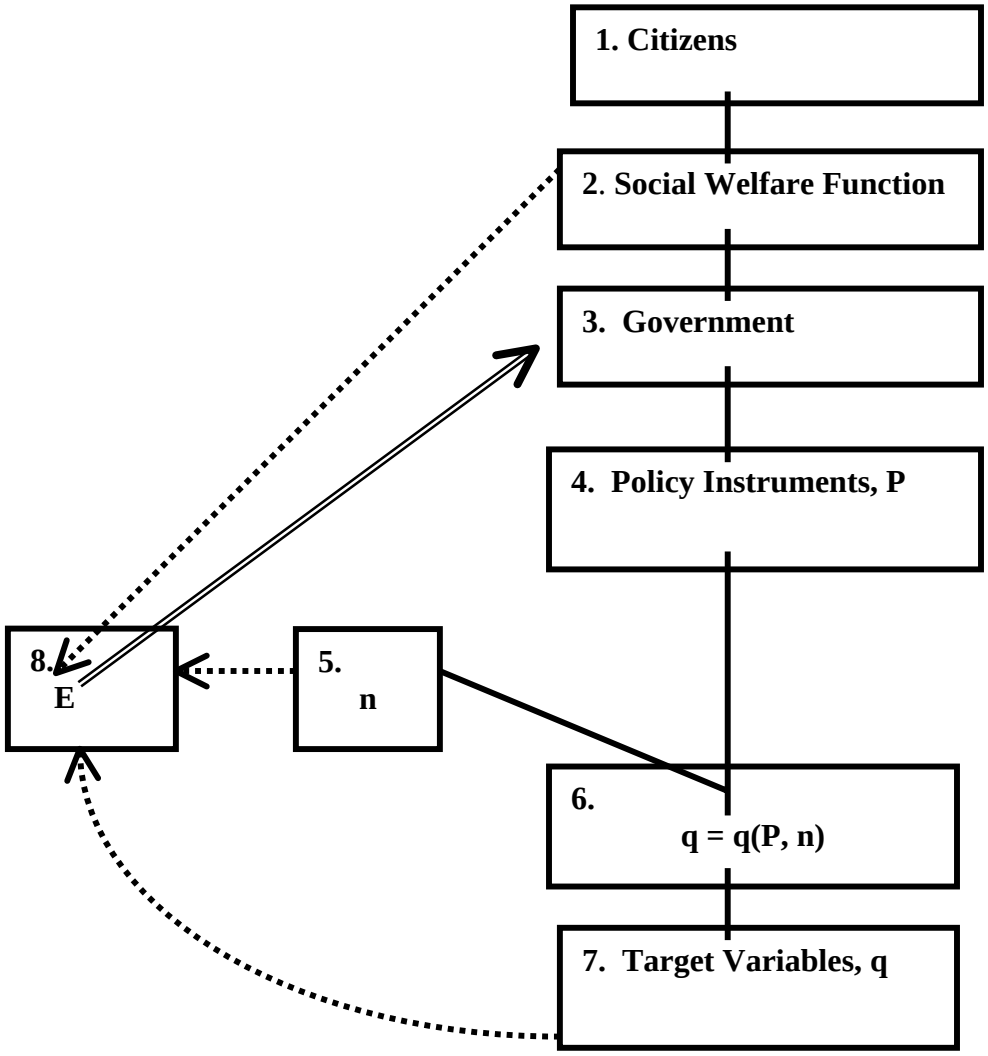


FIGURE 1: Evaluation with Complete Information



Source: McVittie & Swales (2003).

FIGURE 2: Evaluation with Incomplete and Inaccurate Information