

Comments on: Examining Fisher Information in Multi-Sector DGE Models

Diego Rodríguez

Banco de la República de Colombia

<http://www.banrep.gov.co>



Introduction

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- Dynamic general equilibrium models and their deep parameters may feature lack of identification or other deficiencies related to the objective function used in their estimation or empirical validation



Introduction

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- Dynamic general equilibrium models and their deep parameters may feature lack of identification or other deficiencies related to the objective function used in their estimation or empirical validation
- Deficiencies can be inherent to the model structure



Introduction

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- Dynamic general equilibrium models and their deep parameters may feature lack of identification or other deficiencies related to the objective function used in their estimation or empirical validation
- Deficiencies can be inherent to the model structure
- Which one is a good practice prior to the estimation procedure?



Introduction

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- Dynamic general equilibrium models and their deep parameters may feature lack of identification or other deficiencies related to the objective function used in their estimation or empirical validation
- Deficiencies can be inherent to the model structure
- Which one is a good practice prior to the estimation procedure?
- Perform routinely diagnostics of the objective function



Introduction

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- Dynamic general equilibrium models and their deep parameters may feature lack of identification or other deficiencies related to the objective function used in their estimation or empirical validation
- Deficiencies can be inherent to the model structure
- Which one is a good practice prior to the estimation procedure?
- Perform routinely diagnostics of the objective function
- The document presents a modeling strategy by examining local identification of a multi-sector DGE model in a full information likelihood based framework



Introduction

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- Dynamic general equilibrium models and their deep parameters may feature lack of identification or other deficiencies related to the objective function used in their estimation or empirical validation
- Deficiencies can be inherent to the model structure
- Which one is a good practice prior to the estimation procedure?
- Perform routinely diagnostics of the objective function
- The document presents a modeling strategy by examining local identification of a multi-sector DGE model in a full information likelihood based framework
- The document also provides computational details for state space representations with unit roots



● Introduction

Procedure

● Six Steps

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

Procedure



Six Steps

● Introduction

Procedure

● Six Steps

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document presents the procedure used to examine local identifiability of a simple multi-sector DGE model



Six Steps

● Introduction

Procedure

● Six Steps

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document presents the procedure used to examine local identifiability of a simple multi-sector DGE model
- The procedure includes test of the rank of the information matrix, examination of various sub blocks of the information matrix, checks of the expected likelihood function for given points in the the parameter space and some others



Six Steps

● Introduction

Procedure

● Six Steps

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document presents the procedure used to examine local identifiability of a simple multi-sector DGE model
- The procedure includes test of the rank of the information matrix, examination of various sub blocks of the information matrix, checks of the expected likelihood function for given points in the the parameter space and some others
- Some of those steps are computationally easy and cheap, this allows to get insight of the model properties and limitations



Six Steps

● Introduction

Procedure

● Six Steps

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document presents the procedure used to examine local identifiability of a simple multi-sector DGE model
- The procedure includes test of the rank of the information matrix, examination of various sub blocks of the information matrix, checks of the expected likelihood function for given points in the the parameter space and some others
- Some of those steps are computationally easy and cheap, this allows to get insight of the model properties and limitations
- This is a good practice prior the estimation of the model because it helps to distinguish from problems arising from the model or the data



Six Steps

● Introduction

Procedure

● Six Steps

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document presents the procedure used to examine local identifiability of a simple multi-sector DGE model
- The procedure includes test of the rank of the information matrix, examination of various sub blocks of the information matrix, checks of the expected likelihood function for given points in the the parameter space and some others
- Some of those steps are computationally easy and cheap, this allows to get insight of the model properties and limitations
- This is a good practice prior the estimation of the model because it helps to distinguish from problems arising from the model or the data
- The procedure is valid both for classical and bayesian econometrics



● Introduction

Procedure

The Fisher Information Matrix

● Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

The Fisher Information Matrix



Fisher Information Matrix

● Introduction

Procedure

The Fisher Information Matrix

● Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document describes the computation of a Fisher Information Matrix for state space representations that presents unit root



Fisher Information Matrix

● Introduction

Procedure

The Fisher Information Matrix

● Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document describes the computation of a Fisher Information Matrix for state space representations that presents unit root
- This computation is useful for models with stochastic trends driving the economy in the long run



Fisher Information Matrix

● Introduction

Procedure

The Fisher Information Matrix

● Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document describes the computation of a Fisher Information Matrix for state space representations that presents unit root
- This computation is useful for models with stochastic trends driving the economy in the long run
- Specially useful for balanced growth multi-sectoral models that includes different rates of growth for different sectors



Fisher Information Matrix

● Introduction

Procedure

The Fisher Information Matrix

● Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document describes the computation of a Fisher Information Matrix for state space representations that presents unit root
- This computation is useful for models with stochastic trends driving the economy in the long run
- Specially useful for balanced growth multi-sectoral models that includes different rates of growth for different sectors
- An important implication is that models need not to be stationarised prior the analysis.



Fisher Information Matrix

● Introduction

Procedure

The Fisher Information Matrix

● Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

- The document describes the computation of a Fisher Information Matrix for state space representations that presents unit root
- This computation is useful for models with stochastic trends driving the economy in the long run
- Specially useful for balanced growth multi-sectoral models that includes different rates of growth for different sectors
- An important implication is that models need not to be stationarised prior the analysis.
- This simplify the model analysis, estimation, and the mapping between model variables and the observed data.



● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

● Technical Details

Application to a Multi-Sector Model

Final Comments

Computational Issues



Technical Details

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

● Technical Details

Application to a Multi-Sector Model

Final Comments

- In order to validate the rank condition for the information matrix it is used a statistic based on the singular decomposition of the matrix



Technical Details

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

● Technical Details

Application to a Multi-Sector Model

Final Comments

- In order to validate the rank condition for the information matrix it is used a statistic based on the singular decomposition of the matrix
- Presents the conditions needed for a parameterized model to have an non-stochastic balance-growth steady state



Technical Details

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

● Technical Details

Application to a Multi-Sector Model

Final Comments

- In order to validate the rank condition for the information matrix it is used a statistic based on the singular decomposition of the matrix
- Presents the conditions needed for a parameterized model to have an non-stochastic balance-growth steady state
- Shows how to compute the first order accurate policy function for these types of models and the proper classification of the unit roots.



Technical Details

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

● Technical Details

Application to a Multi-Sector Model

Final Comments

- In order to validate the rank condition for the information matrix it is used a statistic based on the singular decomposition of the matrix
- Presents the conditions needed for a parameterized model to have an non-stochastic balance-growth steady state
- Shows how to compute the first order accurate policy function for these types of models and the proper classification of the unit roots.
- The paper discusses which one is the correct state-space representation in order to compute the Fisher Information Matrix with the presence of unit roots.



● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Mo

● Application 1

● Application 2

Final Comments

Application to a Multi-Sector Model



Application 1

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

■ Model to describe medium-term consumer inflation



Application 1

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- Model to describe medium-term consumer inflation
- Small open economy model with multi-sectors production with these characteristics:



Application 1

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- Model to describe medium-term consumer inflation
- Small open economy model with multi-sectors production with these characteristics:
- Permanent trend in the relation of tradable and no tradable (Different trend between production exportable sector and the technology of the non-tradeable sector)



Application 1

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- Model to describe medium-term consumer inflation
- Small open economy model with multi-sectors production with these characteristics:
- Permanent trend in the relation of tradable and no tradable (Different trend between production exportable sector and the technology of the non-tradeable sector)
- Permanent shocks to the terms of trade



Application 1

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- Model to describe medium-term consumer inflation
- Small open economy model with multi-sectors production with these characteristics:
- Permanent trend in the relation of tradable and no tradable (Different trend between production exportable sector and the technology of the non-tradeable sector)
- Permanent shocks to the terms of trade
- Export production relative disconnected from domestic consumption



Application 2

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- It is possible to describe the behavior of the model on a non-stochastic balanced growth path in terms of growth rates and nominal expenditures shares



Application 2

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- It is possible to describe the behavior of the model on a non-stochastic balanced growth path in terms of growth rates and nominal expenditures shares
- The particular steady state of the model depends on the stochastic shocks



Application 2

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- It is possible to describe the behavior of the model on a non-stochastic balanced growth path in terms of growth rates and nominal expenditures shares
- The particular steady state of the model depends on the stochastic shocks
- After assign the shocks, the particular steady state can be computed and it is possible evaluate the log-linearized policy function around this steady state



Application 2

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- It is possible to describe the behavior of the model on a non-stochastic balanced growth path in terms of growth rates and nominal expenditures shares
- The particular steady state of the model depends on the stochastic shocks
- After assign the shocks, the particular steady state can be computed and it is possible evaluate the log-linearized policy function around this steady state
- The policy function is independent of this choice



Application 2

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

● Application 1

● Application 2

Final Comments

- It is possible to describe the behavior of the model on a non-stochastic balanced growth path in terms of growth rates and nominal expenditures shares
- The particular steady state of the model depends on the stochastic shocks
- After assign the shocks, the particular steady state can be computed and it is possible evaluate the log-linearized policy function around this steady state
- The policy function is independent of this choice



● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

● Comments

Final Comments



Comments

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

● Comments

- In order to stationarised DGE models a common practice is to scaling for the underlying technological process and the population growth rate



Comments

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

● Comments

- In order to stationarised DGE models a common practice is to scaling for the underlying technological process and the population growth rate
- Which one is the correct scaling when there are more than one sector, since different sectors have different growth rates of technology?



Comments

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

● Comments

- In order to stationarised DGE models a common practice is to scaling for the underlying technological process and the population growth rate
- Which one is the correct scaling when there are more than one sector, since different sectors have different growth rates of technology?
- For a two sector model with different technology growth the document presents an excellent device to obtain trend in the real exchange rate with a non-stationarised model



Comments

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

● Comments

- In order to stationarised DGE models a common practice is to scaling for the underlying technological process and the population growth rate
- Which one is the correct scaling when there are more than one sector, since different sectors have different growth rates of technology?
- For a two sector model with different technology growth the document presents an excellent device to obtain trend in the real exchange rate with a non-stationarised model
- This is a well know characteristic of the Colombian economy



Comments

● Introduction

Procedure

The Fisher Information Matrix

Computational Issues

Application to a Multi-Sector Model

Final Comments

● Comments

- In order to stationarised DGE models a common practice is to scaling for the underlying technological process and the population growth rate
- Which one is the correct scaling when there are more than one sector, since different sectors have different growth rates of technology?
- For a two sector model with different technology growth the document presents an excellent device to obtain trend in the real exchange rate with a non-stationarised model
- This is a well know characteristic of the Colombian economy