

## Solving Dsge Models With Perturbation Methods And A Change

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Solving DSGE models with perturbation methods and a change of variables 1. Introduction. This paper explores the application of the changes of variables technique to solve the stochastic... 2. The stochastic neoclassical growth model. As mentioned above, we want to explore how the approximated ...

**Solving DSGE models with perturbation methods and a change ...**

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Journal of Economic Dynamics & Control 30 (2006) 2509–2531 Solving DSGE models with perturbation methods and a change of variables Jesu´s Ferna´ndez-Villaverdea,, Juan F. Rubio-Ramı´rezb aDepartment of Economics, 160 McNeil Building, 3718 Locust Walk, University of Pennsylvania, Philadelphia, PA 19104, USA

## **Solving DSGE models with perturbation methods and a change ...**

Perturbation and Projection Methods for Solving DSGE Models Lawrence J. Christiano Discussion of projections taken from Christiano-Fisher, 'Algorithms for Solving Dynamic Models with Occasionally Binding Constraints', 2000, Journal of Economic Dynamics and Control.

## **Perturbation and Projection Methods for Solving DSGE Models**

• Step 1: We parameterize the original problem as a perturbation from the case we know how to solve  $g(\varepsilon) = 0$ , all  $\varepsilon$  where  $\varepsilon$  is a perturbation parameter, and  $g(\varepsilon)$  is the function that returns the lowest solution. —  $\varepsilon = 0$  corresponds to the case we know how to solve —  $\varepsilon = 0.1$  corresponds to our original problem

## **Econ 871: Solving DSGE Models Using Perturbation Method**

Then, the perturbation model (1) can be restated as follows: (3)  $E_t f(y_{t+1}, y_t, x_{t+1}, x_t) = 0$ , (4)  $y_t = g(x_t)$ , (5)  $x_{t+1} = h(x_t) + \sigma \eta_{t+1}$ , where the functions  $g(x_t)$  and  $h(x_t)$  are the solution to the model in the new notation. Note that the last element of  $f$  is condition (2) and the last element of  $x_t$  is  $\sigma$ .

## **Fifth-order perturbation solution to DSGE models ...**

Standard perturbation methods provide a Taylor expansion of the policy functions that characterize the equilibrium of the economy in terms of the state variables of the model and a. ... Solving DSGE models with perturbation methods and a change of variables ...

## **Solving DSGE models with perturbation methods and a change ...**

The material is grouped into two parts. Part I: Solving DSGE Models (Sections 2–7) is devoted to solution techniques, which are divided into perturbation and projection techniques. Part II: Estimating DSGE Models (Sections 8–12) focuses on estimation. We cover both Bayesian and frequentist estimation and inference techniques. PART I. SOLVING DSGE MODELS

## **Solution and Estimation Methods**

• Dynare and other local perturbation methods provide solution around the deterministic steady state • Recent studies highlight the importance of nonlinearity in DSGE models: - financial crises in closed or open economies - implications of rare disasters (such as COVID-19) - portfolio choices models with many financial assets

## **Global DSGE Models - GDSGE: A Toolbox for Solving DSGE ...**

The FOCs of a DSGE model are of the form:  $E_t f(y; ; ) = 0$  (3) Let  $y = h( ; )$  be the unknown policy function. First order (perturbation) method: Find the coefficients of the linear approximation to the  $h( ; )$  function, i.e.  $h( ; ) = h_0( ) + h_1( )$ . Higher order (perturbation) method: Find the coefficients of the higher

## Solving DSGE Models with Dynare

A consensus in methodology is reached to use this kind of model. Solving DSGE models remains a continuing area of interest. This paper gives an overview of available solution techniques. Linear approximation methods and perturbation methods are explored in detail. Solution strategies such as the eigenvalue-eigenvector decomposition of Blanchard

## DSGE Models - solution strategies

Solving DSGE Models 2 Solution Methods for DSGE Models DSGE models do not admit, except in a few cases, a closed-form solution to their equilibrium dynamics that we can derive with \paper and pencil." Instead, we have to resort to numerical methods and a computer to nd an approximated solution.

## Solution and Estimation Methods for DSGE Models

Some solution methods for constant-parameter DSGE models (e.g. Klein (2000), Gensys, Schmitt-Grohe and Uribe (2004)) stack variables of different periods. This type of notation has also been used in switching-parameter DSGE models by Farmer et al. (2011), Foerster et al. (2013).

## E cient Perturbation Methods for Solving Switching DSGE Models

Yuanyuan Chen & Stuart Fowler, 2016. "Hybrid Perturbation-Projection Method for Solving DSGE Asset Pricing Models," Computational Economics, Springer; Society for Computational Economics, vol. 48(4), pages 649-667, December. Jesus Fernandez-Villaverde & Juan F. Rubio-Ramirez, 2006.

## Solving DSGE models with perturbation methods and a change ...

analyze the model and take it to the data successfully. 3 A General Framework A large number of solution methods have been proposed to solve DSGE models. It is, therefore, useful, to have a general notation to express the model and its solution. This general notation will make the similarities and differences among the solution methods clear

## Solution and Estimation Methods for DSGE Models

SEMI-GLOBAL SOLUTIONS TO DSGE MODELS: PERTURBATION AROUND A DETERMINISTIC PATH 8 2. THE MODEL DSGE models usually have the following form:  $E_t f(y_{t+1}, y_t, x_{t+1}, x_t, z_{t+1}, z_t) = 0$  (1),  $z_{t+1} = \Lambda z_t + \sigma \varepsilon_{t+1}$ ,  $\varepsilon_{t+1} \sim N(0, \Omega)$  (2) where  $E_t$  denotes the conditional expectations operator,  $x_t$  is an  $x \times 1$  vector

## Semi-Global Solutions to DSGE Models: Perturbation around ...

Abstract We derive recursive representations of nonlinear moving average (NLMA) perturbations of DSGE models. As the stability of higher order NLMA representations follows directly from stability at first order, these recursive representations provide rigorous support for the practice of pruning that is becoming widespread.

## Pruning in Perturbation DSGE Models - Guidance from ...

Under the assumption that a deterministic path is already known the higher order terms in the expansion are obtained recursively by solving linear rational

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expectations models with time-varying parameters. The present work proposes a method rested on backward recursion for solving this type of models. All papers reproduced by permission.

### **Global Solutions to DSGE Models as a Perturbation of a ...**

Perturbation of the nonlinear moving average policy function provides a direct mapping from a history of innovations to endogenous variables, decomposes the contributions from individual orders of uncertainty and nonlinearity, and enables familiar impulse response analysis in nonlinear settings.

### **Solving DSGE Models with a Nonlinear Moving Average**

rameters. One natural extension of the conventional perturbation method commonly used for DSGE models with no time-varying parameters is to perturb all Markov-switching parameters around their ergodic mean values. We call this "the naive perturbation method." Since certain Markov-switching parameters such as time-varying volatilities do not in

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