

# Spatial Meritocracy Revisited: Efficiency Wages and Oligopoly Reaction Functions with House Price Fluctuations

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## Abstract

In this paper, the author demonstrates a model with New Keynesian microfoundations based on a dynamic *spatial* class of general equilibrium. The author outlines a notation for the intuition of the efficiency wage, nominal house prices, with oligopoly reaction functions. The paper then concludes by identifying new areas for further research that may be feasible with longitudinal or census data, stamp duty data, data on average hourly earnings, and data on the retail price index.

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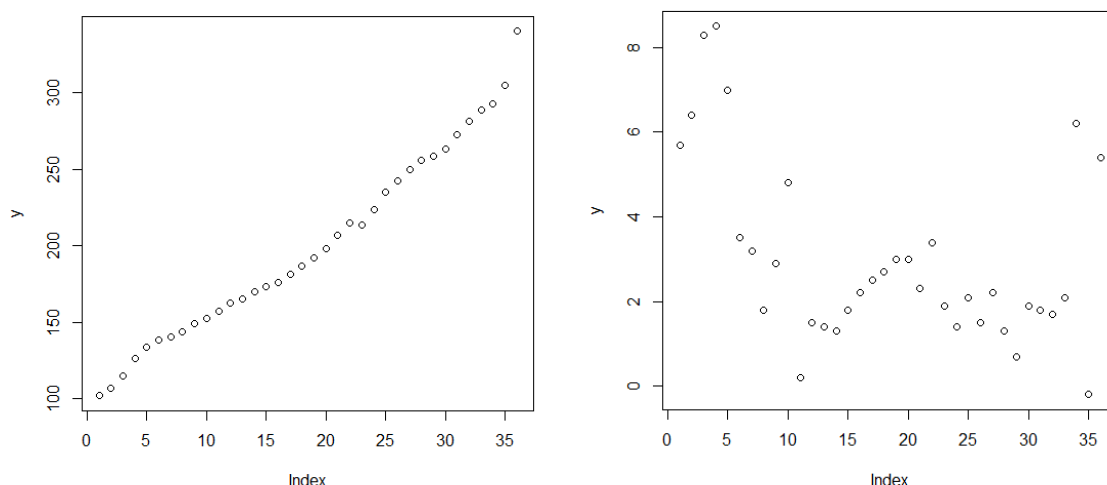
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## Introduction

What are the main policy determinants of the UK real interest rate at the dynamic *spatial* general equilibrium, as per Krugman (1992) and others? What this paper demonstrates is that the central bank's real interest rate<sup>2</sup>,  $r^*$  is seen as a reaction function to the change in output [which itself is a function of total factor productivity growth and the rising capital stock] and the change in inflation. Furthermore, we refer to the existence of a velocity and *digitalised* velocity (Campajola *et. al.*, 2022) which transcends much of the published literature on physical time velocity (Jafarey and Masters, 2003). We highlight the existence of a spatial plane which determines this velocity. It is this spatial characteristic that indemnifies the interest rate's potency. That is, the smaller the vicinity within which the central bank's money supply circulates, the more accelerated the economy's inflationary pressure. We determine that there must be limited but flexible instrumental independence, through the principle-based approach to policy, as opposed to a rules-based approach (Mayaki, 2023). As we now know, the measured contraction in the gross domestic product level may take hold as a result of a material but incremental increase in the interest rate to 'balance' the economic effects of increases in the rate of inflation. This is not necessarily detrimental, so to speak, to the time velocity or micro-velocity (Campajola *et. at.*, 2022) as this empirical observation is indirect<sup>3</sup>, and the variable may very well have increased to a new equilibrium. The following graphs illustrate just how delicate the central bank's concerns are. Some in the literature on the art of curbing inflation have pointed the fact that the focus of policy is almost dead set on curbing the rise of a variable that is unnaturally exponential in its characteristic, that is to say, inflation.

**Fig 1 - UK RPI rebased to 100 (1987 to 2023)**

**Fig 2 - UK Output Growth (GDP Deflator) (1987 to 2023)**



<sup>2</sup> Also referred to empirically as the *equilibrium* real interest rate

<sup>3</sup> I note that there is no evidentially direct relationship between the interest rate and money velocity.

This paper sets out the concept of 'spatial meritocracy' and what purpose does it have in any discussion on the topic of general equilibrium? Surely, dynamic general equilibrium and spatial justice are two contextually distinct concerns? One is largely concerned with monetary economics and the other to a greater extent with the field of urban geography and civil engineering. Spatial meritocracy emerges from spatial justice and the two are both layered and interdisciplinary in their nature, so much so that it creates a transfusion of operative domain knowledge, and commands the requisition of a relevant skillset from any researcher competent enough to uncover its value. Furthermore, let us not forget the importance of spatial econometrics in deriving the fundamental and provoking outcomes that research in spatial justice is so consistently built upon. Spatial meritocracy is focused on embracing these outcomes, and focusing them/channeling them into equitable policy decisions. It's not a widely used or prolific term. I believe I am one of the first to have ever used it in the literature. The only other literal use of the term was by Averett University Professor, Jeremy Groskopf, in his critically-acclaimed non-fiction book on the recent history of American advertising. In his book, entitled "Profit Margins", Groskopf explains:

*"Beyond cost concerns, questions of reliability of the audience were as noteworthy for peripheral advertising as they were for all other methods. Indeed, questions of reliability took on much heavier importance with the breakdown of assumptions of receptivity. It is noteworthy that the above claims about being bored by the films were made by frame designers who, despite arguing for a spatial meritocracy, remained pessimistic about advertising's ability to draw attention on its own merits. As numerous inventors implied, the advertising needed, at the very least, to be associated with the main screen in order to be considered viable; as such the positioning of the technology, even if the screen was off-limits, still implied that the audience needed to be nearly, if not entirely, forced to read advertising." pp. 215 (Groskopf, 2021)*

I felt it was somewhat necessary to reach out to Jeremy Groskopf for the sake of reconciling some of our differences. When prompted for a definition for this complex term, the author and Ph.D. instructor, Groskopf, was more than available to provide one, stating explicitly and in no uncertain terms in an e-mail reply to a question I asked about complexity. He writes: "In the context of that section of the book, a 'spatial meritocracy' would apply to any venue where the film was forced to directly compete for attention with advertisements nearby on the walls. People who made and sold early theatrical advertising technology liked to think of advertising as something that could be just as appealing to a viewer as anything else".

Groskopf continues: "So, if advertisements were allowed to be placed right next to the film screen, then - they argued - the most interesting item would win the attention of

the audience. (This is effectively the same reason why advertisers like to have their ads on the same page as content in a magazine, rather than collecting all ads into an advertising section. This allows the ads to compete with the content head-to-head, rather than being relegated to a separate location)". This is all somewhat utopian, of course. The film would always have been placed in the centre, with the ads slightly off to the side. And an unchanging advertisement in a movie theater would likely become less interesting the longer it was available. But anyone arguing that audience attention would be given to the most deserving item in view was making a sales pitch. So we shouldn't be too surprised by over-the-top assertions." (Groskopf, 2021).

## The Model

The following subsection of this paper will answer a few important questions. In agreement to Groskopf (2021) this paper perceives spatial meritocracy to be necessarily based on the successes of applied spatial econometrics, which is a relatively new field of economic design and modelling that allows for Economists to add and propose model features with a certain level of geographical intuition. However, having explored these settings with multidimensional variables and in panel form (as opposed to more granular data) in the context of the efficiency wage (Mayaki, 2023) which can be estimated around the interest rate, I will only explore the hypothetical annotations of this particular model. Applied spatial econometrics is covered in Kopczewska (2021) where the author in Chapter 5 explains the relevance of a number of key features of the econometric field, including spatial dependence and autocorrelation, with the eventual objective of deriving spatially robust results from estimated datasets.

This paper must also necessarily dive a little deeper into the concept of Krugman's dynamic *spatial* general equilibrium outlined in the introduction. The interest rate is, of course, derived at the long-run steady state across variables, for all regions within the model. Building a panel model with microfoundations may be an uphill challenge because of lack of access to longitudinal data, hence it may imply certain assumptions to be true that are necessary for the general equilibrium to hold in a spatial model, for example, agent preferences and assumptions about the behaviour of wage costs.

Now, consider the nominal interest rate target based on the Taylor rule in the work of Gavin, *et.al.* (2012):

$$r = r^* + 0.5(Y - \bar{Y}) + 0.5(i - \bar{i}) + 2$$

Where output  $Y$  (which itself is the target level of output or gross domestic product and the very same target level of output we use in the estimation for the interest rate  $r$ ) is derived from a function of aggregate level total factor productivity multiplied by capital + labour. Note: A small sorority of practitioners have studied the effect of productivity

on the equilibrium interest rate with empirical findings that demonstrate how productivity growth has slowed since around 2004 (Lundsford, 2017; Yi and Zhang, 2017). The dynamic stability of the aggregate variable for labour is derived from the balanced growth path of a set of expressions that represent firm worker Pareto-efficient payoffs for shirking, effort, leisure, welfare and of course.

If we then assume the output gap evolves around the functional form of total factor productivity (Beckworth and Hendrickson, 2019; David and Zeke, 2021) with the Cobb-Douglas exponents, whereby:

$$Y = AK^{\alpha}L^{\beta} \text{ where } \alpha + \beta = 1$$

This is what distinguishes spatial and stochastic models of this form, i.e. dynamic and *spatial*? The dynamic *spatial* class of models (Kleinman *et. al.*, 2023) are distinct from their dynamic and *stochastic* siblings in that the onus is on spatial equilibrium at steady state rather than equilibrium across all markets (for instance, as in an RBC or New Keynesian economy) with optimal New Keynesian microfoundations (Mehrling, 2009).

What problems does the *spatial* DSGE attempt to explain? The spatial DSGE attempts to explain the significant skills mismatches (Sun, *et.al.*, 2023) - DSGE with skill and firm heterogeneity which according to this paper, mentions the observation that mismatches in skill do not lead to *significant* income disparities

What perspective do dynamic *spatial* models bring to the discussion on spatial justice and meritocracy? Much of the literature on spatial models (Brakman, *et. al.*, 2004) are not DSGE but we nevertheless encounter issues such as disparate wage outcomes (Combes, *et. al.*, 2008) where the literature acknowledges that a polarised distribution exists where clustering of poverty (Ross and Znou, 2008) and unemployment are demonstrable empirically in most metropolitan cities in the US and Europe (Dorn and Zweimüller, 2021) and also most other Emerging Economies (Jeguirim, 2021). These cities are characterised by a concentration of unskilled labour supply and low wages in specific regions of their central cities and inner ring suburbs (Ross and Zenou, 2008).

What variables are important to a DSGE model? Krugman (1992) notates a detailed “centripetal” and “centrifugal” geographical model. In his paper on spatial equilibrium, Krugman then includes expressions which explain these effects with respect to wages. If we consider a simple dynamic *spatial* general equilibrium model where there are  $N$  heterogenous agents, and  $g$  oligopoly firms, each agent  $N$  earns an optimal wage  $w$ , based on preferences over leisure<sup>4</sup> and such that a budget constraint on consumption determines consumption of permanent income. The worker efficiency wage  $w^*$  is an

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<sup>4</sup> Taking productivity as given by the level of aggregate technological progress. When wages are optimal, time spent on leisure is minimised, for the rational agent with strict preference not to shirk there are consumption smoothing effects I describe in Mayaki (2023).

expressed as a function of the oligopoly firm's profit function, we derive the following expression:

$$f(\pi) = m + \delta(g, N, p, q) - w + \varepsilon \text{ s.t. } p \geq 1 \text{ and } i = \bar{x}$$

Where  $m$  is an intercept term representing initial wealth, changes in the medium-term stability  $p$  are determined by exogenous factors such as inflation  $i$ . Spatial dependence is given by the state variable  $\delta$ , spatially autocorrelated residuals are given by  $\varepsilon$  and firm output decisions  $q$  in a specific city location, at any point in time  $t$ .

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