We use the search and match theory with segment specific matching efficiencies, $\phi$, hires, $h$, vacancies, $v$, and unemployment, $u$. $h_t = \phi_t M(u_t, v_t) = \phi u_t v_t e^{-\alpha u_t}$

The social planner’s problem is given by

$$V(u_t, e_t, \xi_t) = \max \left[ \int_{0}^{\infty} \beta^t u_t (\xi_t, e_t) \gamma(1 - \xi) - \gamma(1 - \xi) + \beta E[V(u_{t+1}, e_{t+1}, \xi_{t+1})] \right]$$

where $u_t$ is the control variable, $\xi$ the job destruction rate, $\gamma$ a re-training penalty, and $\mu$ productivity. Counter-factuals maximize output based on the social planner’s allocation of the unemployed, $u_t$, with total output given by $Y_t = \xi e_t u_t$, where $e_{t+1} = (1 - \xi)e_t + h_t(e_t, u_t)$

### Results – occupation

Mismatch by region predates the financial crisis, and so cannot explain the productivity puzzle. But unveiling it (shown with simulations beginning from every third quarter) shows that it has played a significant role as an inhibitor of output and productivity growth. The results are driven by regions where $(\alpha, \mu, \theta)$ are positively correlated.

### Bottom-up market segmentation

- In mismatch, determining both the appropriate type and level of disaggregation is an open problem (Barnihone and Figueira, 2013; Petrongolo and Pisaniello, 2001).
- Our analysis supports this:
  - We find that standard mismatch indices are increasing in the level of disaggregation, and differ by type of disaggregation.
  - We find that estimates of structural parameters also differ by level and type.
- Data show that many job-to-job moves are across sectors or occupations.
- We try to develop a “bottom-up”, data-driven segmentation of the labour market

We group vacancies based upon the demand expressed in the job description. We use machine learning algorithms to do this, processing the text in three steps:

- Latent Dirichlet Allocation to express each vacancy in terms of a vector space composed of N topics
- $\text{FM}$ using ‘weighted saliency’ (Goldsmith-Pinkham et al. 2016)
- The K-means clustering algorithm to group vacancies expressed in topic space into market segments (the type of disaggregation), for many values of $K$
- Silhouette scores to determine $K$ (the level)

Below are word clouds for two of the topics selected by step 1 of the clustering process:

$K = 20$ is chosen by the algorithm as the level of disaggregation. Two example market segments are shown below; market segment 2 is mostly made up of vacancies strong in topic 4, and clearly corresponding to an official classification. Market segment 5 cuts across official classifications, demonstrating the usefulness of the approach. The ultimate aim is to determine the extent of mismatch using this bottom-up approach.

### References


