

# R&D Allocation and Aggregate Productivity\*

Sephorah Mangin<sup>†</sup>

Very preliminary and incomplete draft

15 February 2015

## Abstract

This paper develops a tractable model of directed R&D in an environment of monopolistic competition with heterogeneous product varieties. Entrepreneurs choose how to allocate their R&D efforts across different varieties, giving rise to an equilibrium *R&D allocation*. The nature of the R&D allocation depends on both the elasticity of substitution between varieties and the curvature of the R&D cost function. Aggregate productivity (TFP) growth depends on both the aggregate level of innovation intensity and the degree of productivity dispersion across the economy. In particular, I show that aggregate productivity growth is increasing (decreasing) in the degree of current productivity dispersion if the R&D cost elasticity is less than (greater than) the profit elasticity. I characterize the evolution of the cross-sectional productivity distribution and provide conditions for productivity convergence and a simple expression for the long-run rate of convergence. The rate of productivity convergence depends on the elasticity of substitution between varieties, the R&D cost elasticity, and the tail index of the Pareto distribution of techniques.

*Keywords:* Aggregate productivity, TFP, productivity dispersion, R&D, innovation, productivity growth, productivity convergence, extreme value theory, Pareto distribution, Fréchet distribution

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\*I thank Chris Edmond and Rob Shimer for useful advice at an early stage of this research, and Eric Bartelsman, Horag Choi, and Philipp Kircher for helpful discussions. I also thank my discussant Mei Dong and seminar participants at the University of Edinburgh, VU Amsterdam, the University of Bonn, Monash University, and the Workshop of the Australasian Macroeconomics Society 2014.

<sup>†</sup>Department of Economics, Monash University. Contact email: sephorah.mangin@monash.edu.