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# Hierarchical Growth: Basic and Applied Research\*

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## Abstract

We develop a model that incorporates salient features of growth in modern economies. We combine the expanding-variety growth model through horizontal innovations with a hierarchy of basic and applied research. The former extends the knowledge base, while the latter commercializes it. Two-way spillovers reinforce the productivity of research in each sector. We establish the existence of balanced growth paths. Along such paths the stock of ideas and the stock of commercialized blueprints for intermediate goods grow with the same rate. Basic research is a necessary and sufficient condition for economic growth. We show that there can be two different facets of growth in the economy. First, growth may be entirely shaped by investments in basic research if applied research operates at the knowledge frontier. Second, long-run growth may be shaped by both basic and applied research and growth can be further stimulated by research subsidies. We illustrate different types of growth processes by examples and polar cases when only upward or downward spillovers between basic and applied research are present.

**Keywords:** Basic research, applied research, knowledge base, commercialization, hierarchical economic growth

**JEL Classification:** H41, O31, O41

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