



# Uncertainty and the specificity of human capital

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## Abstract

This paper studies the choice between general and specific human capital. A trade-off arises because general human capital, while less productive, can easily be reallocated across firms. Accordingly, the fraction of individuals with specific human capital depends on the amount of uncertainty in the economy. Our model implies that while economies with more specific human capital tend to be more productive, they also tend to be more vulnerable to turbulence. As such, our theory sheds some light on the experience of Japan, where human capital is notoriously specific: while Japan benefited from this predominately specific labor force in tranquil times, this specificity may also have been at the heart of its prolonged stagnation.

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## 1. Introduction

This paper provides a simple theory of the choice between general and specific human capital. Our theory is based on a trade-off between productivity and the ability to reallocate human capital *ex post*: specific human capital is more productive than general human capital, but, unlike general human capital, it cannot be reallocated across firms. Hence, the determining factor for the choice of human capital is the extent of uncertainty about future productivity that firms and workers face when making investment decisions: economies with lower such uncertainty tend to

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have more workers with specific human capital, and thus tend to be more productive. However, economies with more specific human capital tend to be more vulnerable to shocks due to the inherent difficulty in reallocating such capital.

Our theory provides a coherent, though stylized, view of the Japanese economic experience since the 1950s, which can be loosely characterized as a long period of success followed by a prolonged stagnation. Our model attributes the first phase to the predominance of specific human capital in Japan, a fact well documented by [8]. We then appeal to the recent increase in economic volatility, a phenomenon which [14] refers to as *turbulence*, as the trigger and to the composition of the Japanese labor force as the driving force behind the recent Japanese economic experience.<sup>1</sup> A lack of reallocation of labor of the kind that our model generates following a turbulence shock has long been suggested as an important source of Japan's stagnation (e.g. see [10] and [12]). Unlike most proposed explanations, our theory generates a prolonged stagnation without relying on any inefficiencies.<sup>2</sup>

The environment we consider is an overlapping generations model where workers accumulate human capital when young, work when middle-aged, and retire when old. Cohorts of firms (or projects) are clearly identified with generations of workers. Upon paying a fixed cost of entry, firms receive a signal (good or bad) about their future productivity and hire young workers accordingly: firms who expect to be more productive hire more specific human capital. Firms are only productive during the second period of their existence, as are their workers. At the beginning of that second period, firms realize their level of productivity (high or low) and may alter the amount of generalists used in production if desired.

Firms and workers in our environment sign long-term employment contracts. This market arrangement is essential since firms with good signals who realize a low productivity level end up with more specialists than they would like. Consequently, firms with unexpectedly low productivity would like to dispose of some of their workers who have acquired specific human capital. Clearly, these long-term contracts would be meaningless without commitment, not only from firms, but also from financial intermediaries (insurers) who end up bailing out firms (and workers) with unexpectedly low realized productivity.

In this model, *ex ante* idiosyncratic uncertainty determines the allocation of human capital investment. Three types of equilibria may emerge in the model, depending on the expected productivity level of firms with good or bad signals, as well as the relative productivity of specific versus general human capital. The entire equilibrium path for all cases is fully characterized. A key result is that output is higher in economies where signals are more informative. Intuitively, this is true because human capital is better allocated *ex post* in economies with more precise signals. We also show that under certain conditions, firm-specific human capital is more predominant in economies where signals are more precise.

We use the model to study the impact of turbulence. We model turbulence as a state of the world in which signals carry no information, so that firms with good and bad signals are equally likely to receive a high productivity level. As the precision of signals changes, however, we keep the fraction of firms with high productivity constant, so that in a well defined sense the aggregate technology set remains unchanged. Accordingly, turbulence has no impact in economies where all individuals acquire general human capital. We show that a regime switch from tranquil to

<sup>1</sup> See [4] for empirical evidence on turbulence and increased volatility at the firm level observed in the last 20 years or so across many countries.

<sup>2</sup> See [11] and [17] for a review. [3]'s theory, which revolves around the emergence of China as a major competitor for Japan, is an exception.

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