

# Productivity growth and agricultural out-migration in the United States

Benjamin N. Dennis<sup>a</sup>, Talan B. İşcan<sup>b,\*</sup>

<sup>a</sup> *Department of Economics, University of the Pacific, 3601 Pacific Avenue,  
Stockton, CA 95211, United States*

<sup>b</sup> *Department of Economics, Dalhousie University, Halifax, NS, Canada B3H 3J5*

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## Abstract

In the 20th century U.S., the average annual decline in the relative farm share of employment was 3.6%. Despite this rapid reallocation of labor, a large wage gap persisted between the farm and non-farm sectors that declined only slowly over time. We develop a model of farm out-migration with three driving forces: (i) absolute farm productivity growth in conjunction with subsistence food consumption, (ii) relative farm productivity growth in conjunction with a low elasticity of substitution between farm and non-farm goods, and (iii) endogenously declining wage gaps. Quantitative features of the model accord well with the U.S. experience during this period.

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## 1. Introduction

Throughout the world, gradual but massive migration from the farm to the non-farm sector has accompanied industrialization and capitalist development. The U.S. experience is especially remarkable. In the 20th century, coinciding with an acceleration of farm productivity growth, the average annual decline in the farm share of employment relative to non-farm employment was approximately 3.6%. Yet despite considerable and steady off-farm migration, the 20th century

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\* Corresponding author. Tel.: +1 902 494 6994; fax: +1 902 494 6917.

*E-mail addresses:* [bdennis@pacific.edu](mailto:bdennis@pacific.edu) (B.N. Dennis), [tiscan@dal.ca](mailto:tiscan@dal.ca) (T.B. İşcan).

*URL:* <http://myweb.dal.ca/tiscan>.

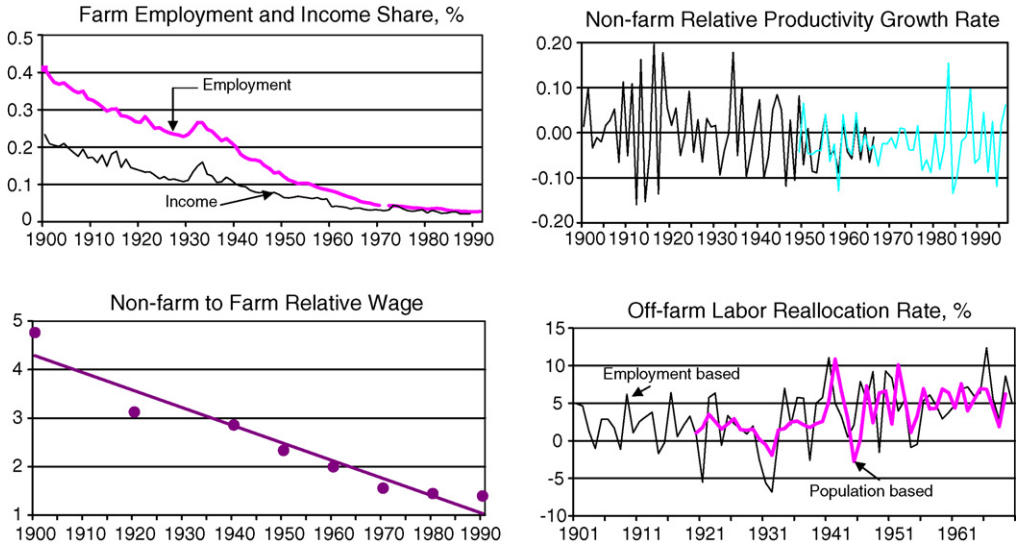


Fig. 1. U.S. Farm Data.

U.S. economy was characterized by a significant gap between farm and non-farm real wages that declined only gradually over time. Fig. 1 presents these striking trends.<sup>1</sup> A key puzzle involves how to explain the relationship between these rapid labor flows and the slow change in the farm–non-farm wage gap over time. In answer to this puzzle, we show that both of these phenomena are ultimately caused by the patterns of absolute *and* relative productivity growth in the 20th century U.S. Our main contribution is two-fold: (i) we develop endogenously determined, persistent wage gaps that experience a secular (and gradual) decline and, simultaneously, (ii) we account for the reallocation of labor from the farm to the non-farm sector in an internally consistent fashion.

The traditional account of off-farm migration has emphasized *absolute* farm productivity growth in conjunction with the subsistence consumption of agricultural goods.<sup>2</sup> This explanation is quite intuitive. As productivity in agriculture rises, supply outstrips demand due to the low income elasticity of demand for farm goods. As a result, labor moves out of agriculture. This explanation is empirically appealing as well. Absolute farm productivity growth in the U.S. accelerated at the same time that farm out-migration accelerated, and the low income elasticity of demand for farm goods is one of the few undisputed facts in economics. This is the first driving force of farm out-migration that we identify.

The second driving force of farm out-migration is relative farm–non-farm productivity growth, which has also been a remarkably important feature of the U.S. data in the 20th century. This observation hinges critically on a non-unitary elasticity of substitution between farm and non-

<sup>1</sup> We discuss our data sources underlying this figure and our estimates throughout the paper in Appendix A. We shall use “off-farm labor reallocation” and “off-farm migration” interchangeably. Although they are in general distinct, both measures of structural change point in similar directions after 1920; e.g., compare employment share versus population based estimates in Fig. 1. See Gardner (2002) for a recent account of the off-farm migration trends, and Olmstead and Rhode (2000) for an account of structural transformation in northern U.S. agriculture.

<sup>2</sup> See, e.g., Nurkse (1953), Lewis (1954), Timmer (1988), and Kongsamut et al. (2001).

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