



# From tradition to modernity: Economic growth in a small world<sup>☆</sup>



Ines Lindner<sup>a</sup>, Holger Strulik<sup>b,\*</sup>

<sup>a</sup> VU University Amsterdam, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands

<sup>b</sup> University of Göttingen, Department of Economics, Platz der Göttinger Sieben 3, 37073 Göttingen, Germany

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## ABSTRACT

This paper introduces the Small World model into the theory of economic growth and investigates how increasing economic integration affects firm size and efficiency, norm enforcement, and aggregate economic performance. When economic integration is low and local connectivity is high, informal norms control entrepreneurial behavior and more integration mainly improves search for investment opportunities. At a higher level of economic integration neighborhood enforcement deteriorates and formal institutions are needed to keep entrepreneurs in check. A gradual take-off to perpetual growth is explained by a feedback effect from investment to the formation of long-distance links and the diffusion of knowledge. If formal institutions are weak, however, the economy does not take off but stagnates at an intermediate income level. Structurally, the equilibrium of stagnation differs from balanced growth by the presence of many small firms with low productivity.

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## 1. Introduction

The transition from a pre-modern or traditional to a modern society is frequently described as modernization. Modernization theory emphasizes the process of increasing social integration and its economic, social, and cultural ramifications. On the economics side, the notion of modernization encompasses the increasing movement of goods, people, and information among formerly remote subpopulations, which is typically accompanied by increasing efficiency, increasing firm size, and economic growth (Kuznets, 1966; Rostow, 1959).<sup>1</sup> In terms of social and cultural ramifications, modernization is characterized by a change in values and beliefs (Inglehart and Baker, 2000). The individual becomes more important while the family and local community decrease in importance. Strong local ties are augmented or replaced by weak

long-distance links (Granovetter, 1973). Cultural change may have important repercussions on economic performance. This is particularly the case if the vanishing power of local norm enforcement is not appropriately replaced by formal institutions. Modernization may then entail decreasing trust, leading to non-cooperative behavior and increasing inefficiency of the economy (Fukuyama, 1995; Polanyi, 1957).

This paper offers a network-based theory of economic growth that integrates economic as well as social aspects of modernization. It treats cultural change as both cause and consequence of economic development, and investigates the modernization process from a traditional society towards an economically fully integrated modern society. In this paper, a traditional society is defined as a largely localized network, in which people predominantly interact with their neighbors. High local connectivity prevents the search for high-yield investment opportunities and implies an inefficient existence of many small firms. An advantage of high local connectivity, however, is a high degree of neighborhood monitoring which prevents entrepreneurs from misbehaving and guarantees investors a fair return on their investment.

A modern society, in contrast, is conceptualized as a global network that places less importance on local neighborhoods. Given a high presence of long-distance links, it is relatively easy to search for high-investment opportunities. This effect of economic integration leads to a higher concentration of capital among firms with high productivity, increasing average firm size, and the gradual extinction of small low-productivity firms. The loss of local connectivity, however, also entails a loss of neighborhood control. This creates the need for strong formal institutions to reinforce honest (cooperative) behavior. Without such institutions, entrepreneurs have an incentive to enrich themselves at the expense of their “anonymous” investors. Anticipating this behavior,

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\* Corresponding author.

E-mail addresses: [i.d.lindner@vu.nl](mailto:i.d.lindner@vu.nl) (I. Lindner),

[holger.strulik@wiwi.uni-goettingen.de](mailto:holger.strulik@wiwi.uni-goettingen.de) (H. Strulik).

<sup>1</sup> Theories of economic stagnation and growth and the associated transformation process of economies are offered by unified growth theory, see Galor and Weil (2000), Galor and Moav (2002), Galor and Mountford (2008); see Galor (2005, 2011) for comprehensive surveys. Modernization as social development is not addressed in this literature and the steady-state of stagnation is usually associated with an economy close to subsistence. Ashraf and Galor (2011) investigate in this framework the role of geographic proximity and isolation on cultural assimilation and on long-run economic performance before and after industrialization.

people are reluctant to invest and a suboptimally high number of small, inefficient firms persist.<sup>2</sup>

The economic consequences of social relationships and their basis on shared values and norms are frequently discussed under the heading of “social capital”. Researchers of social capital thereby emphasize the crucial role of networks to gain a proper understanding of the phenomenon: “The study of social capital is that of network-based processes that generate beneficial outcomes through norms and trust” (Durlauf and Fafchamps, 2005). Over the last decade, the role of social capital for economic growth has been documented empirically (e.g. Ahlerup et al., 2007; Knack and Keefer, 1997; Tabellini, 2010; Zak and Knack, 2001) and theoretically (e.g. Annen, 2003; Francois and Zbojnik, 2005; Guiso et al., 2008; Kumar and Matsusaka, 2009; Routledge and Von Amsberg, 2003; Tabellini, 2008; Zak and Knack, 2001). So far, however, an evolving network representing the pros and cons of strong and weak ties has not yet been integrated into the standard theory of economic growth.

This paper offers a network-based theory of economic development by integrating the Small World model (Watts and Strogatz, 1998) into a standard model of economic growth. The Small World model is particularly suited for the analysis of economic integration because it relates important characteristics of networks – the ease of information exchange and the structure of local communities – to geographical proximity by means of characteristic coefficients which can be calculated analytically or approximated through mean field theory. Subsequently, economic exchange through the network can be conveniently analyzed without a concrete specification of the network itself, but by focussing on network properties summarized in simple coefficients, a fact that yields a significant reduction of complexity.

Specifically, we consider a society of overlapping generations which is heterogeneous with respect to entrepreneurial talent. High-ability entrepreneurs are scarce and in a completely localized world hard to find by potential investors. Consequently, people either set up their own firm or invest in their neighbors' firms. With increasing economic integration – modeled as the formation of long-distance links in the Small World model – it becomes easier to search for high-ability entrepreneurs and more people invest in high-productivity firms, implying that average firm size and income per capita increases and the number of low-productivity firms falls. Entrepreneurs also have an information advantage which they may exploit at the expense of investors. At a low level of economic integration, with high local connectivity, neighborhood enforcement limits the appropriation possibilities of entrepreneurs. However, at a higher level of economic integration, local clustering and neighborhood enforcement deteriorates, creating a need for formal institutions (rule of law) to keep entrepreneurs in check.

By introducing a feedback loop from capital accumulation to the formation of long-distance links, it is shown that the theory explains a gradual take-off to perpetual economic growth along which long-distance business relations become dominating and average firm size increases. Perpetual growth, however, requires investor protection through legal enforcement. Without enforceable formal institutions, an economy relying on community enforcement gets stuck in the midst of the process of economic integration. A steady state of stagnation emerges at which the disadvantage of integration from loss of local connectivity and local norm enforcement counterbalances the advantage from knowledge diffusion and efficient investment opportunities. Industrial structure of the stagnating economy is characterized by inefficiently many small firms of low productivity.

Our theory is most closely related to the studies by Zak and Knack (2001) and Farmer and Kali (2007). Zak and Knack consider

heterogeneous interacting investors and investment brokers. Brokers have an information advantage and the incentive to enrich themselves at the expense of investors. They are kept in check by formal and informal institutions. With increasing social distance between broker and investor the power of informal institutions decreases and the incentive to cheat increases. As in our paper, emphasis is placed on (social) distance as a determinant of trust, investment, and efficiency. Business relations, however, are not modeled as a dynamic, evolving network and the theory is not embedded into an endogenous growth framework.<sup>3</sup>

Our network-modeling is partially inspired by Farmer and Kali (2007) who integrated the Small World model into a game-theoretic framework and investigated the consequences of (exogenous) network evolution on economic behavior. We develop these ideas further by integrating the Small World approach into a dynamic general equilibrium context and by establishing a feedback mechanism from investment behavior to the formation of long-distance links.

Our study also contributes to the literature on firm size and development (e.g. Gollin, 2008; Kremer, 1993; Lucas, 1978). It offers a novel explanation for the negative correlation between the degree of economic development (GDP) and average firm size. As in the earlier literature, firm size is found to be negatively associated with total factor productivity (TFP). But whereas the earlier literature assumes time-invariant TFP, we treat TFP as endogenous and evolving over time. It suggests a less benign view on the relatively large number of small firms observable in many less developed countries. This is because small firm size is an indication of inferior formal institutions. For societies relying to a large degree on informal (local) norm enforcement, at some stage further economic integration is predicted to lead to the erosion of local connectivity and trust and trustworthiness. Consequently, these societies stagnate at an intermediate level of economic integration at which entrepreneurs can be kept in check by local norm enforcement, which implies the incidence of inefficiently many firms of small size and low productivity.

The new view on firm size can be illustrated with the help of Fig. 1. The so far available theory argues that it is efficient to have many small firms when TFP (and thus GDP) is low (Gollin, 2008, left-hand side of Fig. 1). We argue that weak formal institutions (low index of contract enforceability) leads to the presence of inefficiently many small firms, which in turn leads to low aggregate TFP and GDP (right-hand side of Fig. 1).<sup>4</sup>

The remainder of the paper is organized as follows. The next section sets up the basic economic model. Section 3 introduces the Small World network and discusses how it can be used to conveniently model the concept of increasing economic integration and its impact on search efficiency and neighborhood enforcement. Section 4 integrates the network into the economic model and discusses dynamics and comparative statics of the steady-state for a given network. Section 5 introduces the feedback effect from capital accumulation to network formation. It derives the main results of our theory of modernization and comparative economic development. Section 6 introduces a second feedback effect from network formation to knowledge spillovers and endogenous growth, and illustrates how the theory of modernization explains the gradual take-off to perpetual economic growth as well as stagnation at an intermediate level of economic integration. Section 7 concludes. Longer derivations and proofs of the propositions are provided in Appendix

<sup>3</sup> Recently, Karlan et al. (2009) investigated trust and investment (loans) in an explicit network which shares many characteristics with the Small World model. They do not address, however, general equilibrium issues and economic growth. Fogli and Veldkamp (2012) investigate innovation activities in two given i.e. non-evolving networks. Like us they are concerned with the impact of network structure on the flow of knowledge. But they do not consider how (evolving) network structure affects social norms, occupational choice, and investment activities.

<sup>4</sup> See La Porta et al. (1997) for evidence on the correlation of firm size, trust, and family ties. See Humphrey and Schmitz (1998) and Fafchamps (2001) for surveys on firm behavior and business networks in developing countries and in Sub-Saharan Africa.

<sup>2</sup> For evidence of the fundamental role of institutions for economic development see Hall and Jones (1999); Acemoglu et al., 2001; Rodrik et al., 2004; Acemoglu and Robinson, 2012.

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