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A growth theory perspective on B2C e-commerce growth in Europe: An exploratory study

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Abstract

Information and communication technologies (ICTs) continue to have a profound effect on the economies and societies where they are used. In this article, we propose three related theories to describe the underlying mechanism for growth in e-commerce revenues at the national level. *Endogenous growth theory* posits that the primary drivers of e-commerce growth are internal to a country. *Exogenous growth theory* suggests that the primary drivers of e-commerce growth are external to an economic system, and reflect the forces of the regional economy. A blend of these, a *mixed endogenous–exogenous growth theory*, incorporates drivers from both the economy and the region of a country. We test a number of hypotheses about e-commerce growth in the context of these theories. The key variables include Internet penetration, telecommunication investment intensity, venture capital and credit card availability, and education level. The data are drawn from 17 European countries over a five-year period from 2000 to 2004, and are analyzed using panel data regression with robust error terms, a variant of weighted least squares. The results show the differential efficacy of internal and external drivers as endogenous and exogenous precursors of e-commerce growth across the countries for a number of different modeling specifications. We conclude with a discussion of alternative approaches to model e-commerce growth in a country. The results also suggest the appropriateness of exploring models of regional contagion for e-commerce growth.

Keywords: Contextual production; Economic analysis; E-commerce; Empirical research; Endogenous growth; Exogenous growth; Growth theory; Theory-building research

1. Introduction

The productive capacity of societies and standard of living of nations are primarily determined by the evolution of technology, and the related information and knowledge are critical components of economic growth [17,89]. The emergence of Internet-based business has radically transformed the global economic and social landscape over the past decade [87]. E-commerce experienced a boom-and-bust business cycle in its transition from the dotcom bubble in 2000 and 2001 back to an economy with more modest expectations for technology-led value. More recently, it has been achieving steady growth in the global setting. The development of e-commerce and related technologies so far has mostly been limited to developed countries and has been relatively slower in the rest of the world [13,23,29,35,36,47]. Recent issues of the *E-Commerce and Development Report* by the United Nations Conference on Trade and Development [114,115] suggest that the majority of developing countries face limitations for the advancement of their digital economies. These limitations stem largely from low income levels, low literacy rates, a lack of payment systems that can support online transactions, and cultural resistance to online transaction-making.

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UNCTAD has proposed these constraints on cross-national e-commerce growth; however, they have not yet been examined empirically. The lack of empirical results highlights the importance of investigating macro-level factors affecting cross-national e-commerce growth.

Prior studies have explored the facilitating and inhibiting factors for e-commerce growth and diffusion across countries [73,125,126]. However, an appropriate theory is needed to explain the different observed levels of e-commerce growth and diffusion [67,128]. This research presents complementary macroeconomic growth theories for interpreting business-to-consumer (B2C) e-commerce growth in the cross-national context. We will explore the macro-drivers of B2C e-commerce growth across countries.[3]

We seek answers to the following research questions:

- Is growth theory useful for investigating B2C e-commerce growth and diffusion across countries? What does it offer beyond current theories?
- How do endogenous growth theory and exogenous growth theory help to organize our thinking about the mechanism for B2C e-commerce revenue growth? What new explanatory capabilities do the theories offer?
- To what extent do the growth theories explain the extent to which growth is driven internally or externally across countries? Does a mixed model further inform us?

This research will permit us to understand the extent to which the growth of B2C e-commerce is driven by factors that are internal or external to the countries in our data set. We specifically employ a *growth theory perspective* from macroeconomics and developmental economics as the basis for eliciting answers to the research questions. We map this perspective to a preliminary and exploratory empirical analysis that involves an illustration of the roles of endogenous and exogenous drivers of e-commerce growth across a set of 17 European countries. The results suggest the potential of variables such as Internet user penetration, telecommunications investment, education level, venture capital availability, and credit card penetration in support of online transaction-making in explaining B2C e-commerce growth. These vary in strength as endogenous drivers of growth when they are from the country for which growth estimation is being performed, and as exogenous drivers of growth when they are from other countries and explain the e-commerce growth of other countries.

The remainder of the article is laid out as follows. Section 2 reviews the development of e-commerce across countries. In Section 3, we introduce the theories of exogenous and endogenous growth and illustrate why they are appropriate to apply to national-level e-commerce growth. In Section 4, we present research hypotheses that we will empirically test to gauge B2C e-commerce growth among 17 European countries. Section 5 lays out the variables and data sources used in this research. Section 6 presents the details of our empirical models (including modeling diagnostics, model formulation and functional form, full and reduced models) and the exploratory empirical results. We conclude in Section 7 with the contributions and limitations of this research.

2. Background: global e-commerce growth

We next define e-commerce to specify what we study and model in this research. We further discuss the background of global Internet diffusion, e-commerce growth, and assess the main thrust of empirical research to date on international aspects of e-commerce.

2.1. Definition of e-commerce

Although there are a number of definitions of e-commerce that are currently available in the literature [61,127,112,94,60,103,50,67], the discussion of e-commerce definitions intends to give idea of our application of growth theory and deliver new knowledge. Zwass [127, p. 3] defines e-commerce as "the sharing of business information, maintaining business relationships, and conducting business transactions by means of telecommunications networks." Treese and Stewart [112, p. 5] define e-commerce as "the use of the global Internet for purchase and sale of goods and services, including services and support after the sale." Kalakota and Whinston [61, p. 3] define e-commerce as "the delivery of information, products/services, or payments via telephone lines, computer networks or any other means." They do not limit their coverage to just Internet-based means. Kauffman and Walden [67, p. 3] emphasize "the Internet as a medium for enabling end-to-end business transactions." Their definition "applies equally well in dot-com [and] Internet-only business settings, as well as more traditional business settings where the new channel of the Internet is being used alongside existing channels."

We seek to identify an appropriate definition for e-commerce that emphasizes the B2C side of e-commerce. This is because our measurement approach is focused on growth in consumer expenditures relative to transaction-making on the Internet—in other words, the revenues of Internet-based sellers. With this in mind, we use a B2C-focused version of Treese and Stewarts' and Kauffman and Walden's definitions: B2C electronic commerce is the use by business and consumers of the global Internet for the sale and purchase of goods and services, including business services and support after the sale to consumers. Similar to Kauffman and Walden [67], we note that the present definition emphasizes the Internet as a medium for end-to-end B2C

[3] We do not include consumer-to-consumer (C2C) e-commerce, since information is tracked by the national agencies that collect data on the digital economy, in spite of the fact that this may constitute an interesting aspect of the actual commerce that is being transacted. In addition, we do not treat the growth of business-to-business (B2B) e-commerce, which would require different modeling and variables to provide an effective interpretation. We also do not emphasize technology adoption as a precursor of e-commerce growth.