

# Macroeconomics Aspects of E-Commerce

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## INTRODUCTION

The opportunities e-commerce offers to consumers and businesses are ubiquitous. Investment in information and communication technology (ICT) allows businesses to reduce costs and find new customers. Consumers have access to more information and choices. The effects e-commerce has on national economies are equally pervasive. In the aggregate, e-commerce improves productivity, increasing GDP and economic growth. While e-commerce enhances economic welfare because it lowers costs and expands markets, it also creates notable issues for government policymakers. Central banks face new challenges in the wake of e-payment and e-money mechanisms. Traditional sources of tax revenue are threatened through online purchases.

This chapter explores what is known about the impact of e-commerce on the macroeconomy.<sup>1</sup> The chapter covers four main areas related to the overall economy: economic growth, monetary policy, fiscal policy, and international trade. First, though, estimates of the size and growth of e-commerce are presented to provide context for the empirical estimates present in subsequent sections. Closing sections discuss directions for future research and conclusions.

## BACKGROUND

E-commerce predates the Internet by decades. Firms began investing in electronic data interchange (EDI) systems in the 1960s. Designed to improve business-to-commerce (B2B) transactions, these systems allowed for better inventory management, reduced transactions costs, and improved communication between suppliers and purchasers (Banerjee & Gohlar, 1994). The propagation of EDI technology was relatively slow. National initiatives in the U.S. and Europe to standardize EDI systems did not begin in earnest until the mid-1970s. An international standard, the Electronic Data Interchange for Administration of Commerce and Trade (EDIFACT), was adopted by the United Nations in 1987 (Graham, Spinardi, Williams, & Webster, 1995).<sup>2</sup> By 1990, transactions by EDI accounted for only five percent of U.S. business transactions with the majority of users representing large manufacturing firms (Banerjee & Gohlar, 1994).

The development of the Internet provided additional opportunities for firms to invest in ICT to improve B2B transactions. By 2002, e-commerce composed 16 percent of B2B transactions in the U.S. (U.S. Census, 2004). More recently, U.S. B2B e-commerce activity totaled \$4.8 trillion and accounted for 38 percent of all U.S. B2B transactions and more than half the B2B in the manufacturing industry in 2012 (U.S. Census, 2014). Although large in the public's eye, business-to-consumer (B2C) transactions traditionally represent a small (albeit growing) share of e-commerce activity. As a percent of total

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e-commerce activity, B2C sales increased from 7.4 percent in 2002 to 11 percent in 2012. In the latter year, retail B2C e-commerce sales totaled \$593 billion dollars or 3.6 percent of total B2C sales (U.S. Census, 2004, 2014).

International estimates of e-commerce activity are scarcer and necessarily less precise. Private sector market researchers estimate that global B2C e-commerce was valued at \$1.2 billion in 2012 (eMarketer, 2014). In Europe, online sales generated \$201 billion in revenue, a 70 percent increase from 2008 (OECD, 2013). In the United Kingdom, B2B and B2C e-commerce transactions increased 47 percent from 2008 to 2013, totaling £492 billion in 2013 (UK Office for National Statistics, 2013). Generally, developing nations lag behind developed nations in the proliferation of ICT, but there is optimism for future growth. Over 20 percent of households in developing nations now have Internet access (OECD, 2013). In addition to infrastructure concerns, businesses considering ICT investment in developing nations also face regulatory uncertainty (Tigre & O'Conner, 2002), which can dampen the incentives to invest (Ishii and Yan, 2004).

## ECONOMIC GROWTH AND E-COMMERCE

Investment in ICT by business enhances a firm's productivity through several avenues. E-commerce reduces costs related to gathering information related to vendors and prices, lessens procurement inventory, delivery related expenses, and improves the relationship between the firm and its customers (Lucking-Reiley & Spulber, 2001).<sup>3</sup> In the aggregate, ICT investments increase the capital stock of society resulting in greater labor productivity in the short run. In the long run, ICT investments can increase the rate of technological innovation and improve the efficiency of labor and capital in the economy.

Despite these theoretical benefits, the economic benefits from e-commerce were initially elusive in empirical studies. This productivity paradox led Robert Solow to proclaim famously that "You can see the computer age everywhere but in the productivity statistics" (Solow, 1987). In retrospect, the paradox turned out to be the consequence of overly optimistic expectations about the size of ICT investment in previous decades (Oliner & Sichel, 1994) and that fact that, e-commerce offers many benefits not directly identified by traditional growth accounting measures. After overcoming the methodological difficulties, more recent literature has indeed found a positive impact on productivity and economic growth from e-commerce. This section reviews this literature, beginning with discussion of ICT's impact on short and long-term gains in labor productivity and economic growth in the U.S. and in the world. The section concludes with a discussion regarding the complications e-commerce creates for calculating various economic statistics.

### Productivity and Economic Growth

In the short-term, investment in ICT by business increases the capital stock of a nation, increasing labor productivity and economic output. In the long term, this capital deepening affects the level but not the growth rate of productivity (Willis, 2004). Estimates regarding the short-run impact that ICT investment has on labor productivity and economic growth rates vary. Estimates for the late 1990s and early 2000s suggest that about one-third of labor productivity rate increases in the U.S. from 1995 to 2004 could be attributed to ICT investment (Jorgenson, Ho, & Stiroh, 2006; Oliner & Sichel, 2000). ICT-related capital formation accounted for 25 percent of U.S. nonfarm business output growth from 1996 to 2004. From

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