The efficiency of postal services in the age of market liberalization and the internet: Evidence from Central and Eastern Europe

Kiril Tochkov

Department of Economics, Texas Christian University, P.O. Box 298510, Fort Worth, TX 76129, USA

A B S T R A C T

The rise in electronic communications and the recent liberalization of the postal market in the European Union have put national postal-service providers in Central and Eastern Europe (CEE) under pressure to restructure and optimize their operations. The paper employs non-parametric methods to measure the relative technical and cost efficiency of CEE postal operators in terms of quantity-based and quality-based output indicators. The results indicate that inefficiency varies between 20% and 30%. Regression analysis attributes efficiency gains to increased competition, institutional reforms, less burdensome customs procedures, and population density, while use of electronic mail was negatively related to postal-service efficiency.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

Rapid expansion of electronic communications over the past two decades has caused a dramatic decline in the demand for postal services, and letter mail in particular. Faced with dwindling mail volume and mounting financial losses, postal operators have attempted to improve efficiency by cutting costs, whereby post offices have been closed and mail boxes dismantled, mail delivery has been cut back, and the workforce has been reduced. But these cost-saving measures have been constrained, as most national postal-service providers are state-owned or government-controlled entities that operate under the universal service obligation, which stipulates national coverage at affordable rates. Furthermore, the monopolistic protection enjoyed by most postal operators in their function as universal-service providers has been gradually eroded as governments have liberalized postal and telecommunication markets. As a result, national postal operators have encountered competition in the most profitable service segments, such as parcel delivery and express mail, while letter mail has mostly remained part of the reserved area of the universal-service provider. Lastly, the additional drop in mail volume and revenues due to the recent global economic and financial crisis has further increased the pressure on postal operators to improve their efficiency.

This paper focuses on the performance and efficiency of postal operators in Central and Eastern Europe (CEE), a region that has been marked by the transition from a centrally-administered to a market-based economic system. Unlike most other state monopolies in the industrial and service sectors that were broken up and privatized in the 1990s, national postal operators in CEE have remained in state ownership and retained their monopolistic position. The lack of restructuring and competition combined with an inadequate legal framework and weak regulatory oversight have prevented postal operators from overcoming their reputation as providers of an inefficient and unreliable mail service.

The accession of 10 CEE countries to the European Union (EU) in 2004 and 2007 instigated major changes as the new member states had to comply with the directives governing the EU postal market. These directives were aimed at improving the efficiency and service quality of deficit-running national postal operators through gradual market liberalization. The first postal directive in 1997 defined maximum weight and price thresholds for letter services reserved for the universal-service provider, while the second directive in 2002 reduced these thresholds, further limiting the scope of the postal monopoly (ITA-Consulting and WIK-Consult, 2009). The third directive in 2008 mandated that the reserved area should be abolished and all postal markets fully opened to competition by December 2010. Although a few CEE countries acted ahead of schedule (including Estonia which liberalized its postal sector in

2009), most other EU member states in CEE chose to delay the implementation of the directive until the end of 2012. This provides the ideal opportunity to investigate the efficiency of postal operators in CEE as they are now exposed to competition from private firms in all segments of their operations.

The goals of the paper are twofold. First, the performance of 17 postal operators in CEE is evaluated over the period 1994—2009. In particular, technical and cost efficiency are measured with regard to various combinations of quantitative and qualitative outputs of postal operations. For this purpose, non-parametric methodology is employed to assess the extent by which CEE postal operators minimize labor and capital costs in the process of collecting and delivering letter mail, parcels, and financial services. The efficiency of each operator in terms of mail volume as well as the speed and reliance of delivery is ranked relative to the best performers in CEE. Second, the paper identifies the determinants of relative efficiency using second-stage regression analysis. The effects of the rise in electronic communication and institutional factors as well financial indicators and the extent of competition are taken into account.

The existing literature has focused largely on the efficiency of postal offices within a single country. Previous studies have examined the performance of postal offices in the United States (Christensen et al., 1993; Grifell-Tatje and Lovell, 2008; Register, 1988), Canada (Clark and Bickerton, 2002), UK (Cazals et al., 2008; Doble, 1995), Japan (Mizutani and Uranishi, 2003), and Switzerland (Filippini and Zola, 2005). Only two papers have compared postal efficiency across a sample of countries. Perelman and Pestieau (1994) estimated the technical efficiency of national postal operators in Western Europe, Japan, and Australia over the period 1975—1989. Iturralde and Quiros (2008) measured technical efficiency and productivity change for 17 postal operators in the EU over the years 1999—2003. Their sample included four CEE postal operators, which were found to be among the most efficient performers. A more recent study examined the effects of privatization on the universal service obligation of postal operators in 21 OECD countries over the period 1980—2007 and reported an overall decrease in service quality (Schuster, 2013).

In contrast to previous papers that have focused exclusively on developed countries, the present study examines postal services in transition economies, where state-owned enterprises tend to be highly inefficient and postal reforms have been initiated only after accession to the EU. In particular, the sample includes advanced CEE countries that have joined the EU as well as countries from the former Soviet Union and the Western Balkans, where the market transition has been more sluggish. Another advantage of this paper is using input prices to calculate cost efficiency, which provides a more suitable measure of overall performance. With few exceptions (e.g., Filippini and Zola, 2005), existing works are limited to the estimation of technical efficiency, which disregards prices and costs. Furthermore, the literature has focused exclusively on the quantitative aspects of postal efficiency, whereas this paper incorporates quality indicators, such as speed and reliability of mail delivery, in the model.[1] Lastly, the present analysis goes a step further than previous studies to identify the factors responsible for cross-country disparities in postal efficiency.[2]

The rest of the paper is organized as follows. The next section describes the methodology and the data. Section 3 presents the

results of the analysis and Section 4 concludes.

2. Methodology and data

2.1. Efficiency measurement

According to Farrell's (1957) seminal work, firms can achieve technical efficiency by minimizing the quantities of inputs used in producing a given level of output.[3] Furthermore, firms could achieve cost efficiency if they found a combination of inputs and corresponding input prices that would minimize overall cost. Cost efficiency is thus a more comprehensive measure than technical efficiency. In practice, the efficiency of a firm is evaluated relative to a reference point on a benchmark production frontier. The efficiency measure is a radial measure of the distance between the firm and the best-practice frontier calculated as the ratio of actual to potential firm performance. Accordingly, a firm is considered efficient if its performance corresponds to a point on the best-practice frontier. In this case actual and potential performances are identical resulting in an efficiency score of 1. In contrast, a score of less than 1 is associated with inefficient firms located below the frontier due to poor performance relative to potential.

The radial measure of efficiency relies on the existence of a benchmark production frontier, which is not observed in practice. Two main approaches have been developed in the literature to deal with this issue. Parametric methods, such as the Stochastic Frontier Approach (SFA), use econometric techniques to estimate a frontier and decompose the stochastic term of the regression model into an inefficiency component and a random error. Non-parametric methods, such as Data Envelopment Analysis (DEA), use mathematical programming to construct a piecewise linear production frontier that envelopes the observed data points and treats all deviations from the frontier as inefficiency. In the literature on postal efficiency, Filippini and Zola (2005), Perelman and Pestieau (1994), and Quiros (2011) have used SFA, whereas Doble (1995), Cazals et al. (2008), and Iturralde and Quiros (2008) have opted for DEA.

The present study adopted the DEA methodology to estimate the efficiency of postal operators in CEE because the non-parametric approach allows the data to determine the form of the frontier without imposing any restriction that might mis-specify the production technology. Although SFA has the advantage of taking into account random error, it requires *a priori* specification of the functional form of the frontier and makes assumptions about the distributional properties of the components of the stochastic term which are often violated (Greene, 1999). The major drawback of the DEA approach is the sensitivity of efficiency measures to outliers and sampling variation. For this reason, this paper uses the bootstrapping method by Simar and Wilson (1998) to test the robustness of our DEA estimates. The bootstrapping produces bias estimates, which are then used to correct for the bias of the original DEA estimates.[4]

The technical efficiency of postal operators is estimated by solving the following input-oriented linear programming model developed by Banker et al. (1984):

---

[1] A notable exception is Doble (1995), who included the average waiting time of customers at UK post offices as an output measuring the quality of service. Moreover, Schuster (2013) measures quality in terms of post office and letter box density.

[2] Copenhagen-Economics (2010) and ECORYS (2008) used regression analysis to explore the determinants of postal employment and mail volumes, respectively, but not postal efficiency.

[3] Alternatively, firms can maximize their output given a certain level of inputs. However, this approach is unsuitable in the context of postal services because the outputs, defined as letter-post mail and parcels, are beyond the control of the postal operator and thus have to be treated as given.

[4] For a detailed discussion of the advantages and disadvantages of the two methods, see Badunenko et al. (2012).