

**Product Market Competition and Corporate Governance Structure Change:
Evidence from the Telecommunications Industry**

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Abstract

In this paper we investigate how product market competition and corporate governance structure are affected by technological, competitive, and regulatory shocks on telecommunications firms brought by the Telecommunications Act of 1996. We find that the effect varies across segments of the Telecommunications industry. Telecommunication equipment and service firms experience increased competition, but no relative strengthening in corporate governance. In contrast, entertainment firms do not experience a change in competition, but adopt stronger governance structures that better control owner-manager agency conflict. We conclude that competition and corporate governance are substitutes, and that both act to mitigate principal-agent problems.

1. Introduction

Corporate governance structures are increasingly studied by academics, regulators, and investors in the wake of scandals at companies like Enron, Tyco, and WorldCom. Given this heightened level of scrutiny, researchers have been investigating what factors affect changes in governance structure. Most recent literature on governance dynamics focuses on the effects of industry-wide deregulation shock on governance structures (Kole and Lehn, 1999; Lehn, 2002; Rennie, 2006). However, this literature tends not to consider the effects of simultaneous changes in product market competition or variation in the effects of industry shocks on different segments within industries.

In this paper, we provide evidence of an association between product market competition and corporate governance structure change. We do so by investigating the effects of competitive and regulatory shocks on telecommunications industry firms between 1993 and 1999. This time period encompasses three years before and after the Telecommunications Act of 1996. During the mid-1990s the telecommunication industry saw growth opportunities increase, barriers between sectors decrease, new entries occur, and competition intensify. The Telecommunications Act of 1996 also reduced regulatory monitoring. Together, these changes create a natural experiment for disentangling links between product market competition and governance structure change.

We have two principle objectives in this study. The first is to investigate the effects of industry shock on the governance structures of telecommunications firms. Prior evidence demonstrates that banks, electric utilities, and airlines adopt governance structures that more effectively control owner-manager agency conflict following

2. The Telecommunication Industry, Governance Change, and Testable Hypotheses

2.1. Background

The Telecommunications Act of 1996 introduced partial deregulation into the telecommunications industry. This Act permitted telecommunications firms from one industry segment to compete with those from other segments. For example, radio and television broadcasters were permitted to own cable television systems. This Act also eliminated ownership restrictions and reduced regulatory oversight by the Federal Communications Commission. In addition, rate structures for cable operators were relaxed to promote competition and flexibility, and incentives were offered to encourage cable companies to compete with local telecommunications firms. Seven regional Bell telephone companies were permitted to market long distance telephone services, and long distance telephone firms and cable companies were allowed to compete with local telephone service providers.

The resulting industry shock from this deregulation obviously affected firms in the telecommunications industry. One such effect is on the governance structures of those firms [Rennie, 2006; Bryan, Hwang, and Lilian, 1999]. This is because technological or regulatory change that increases substitutability of product market goods or services, or lowers barriers to entry, may act to reduce industry concentration and thus increase product market competition. Jensen (1986) suggests product market competition may compel managers to act in value-enhancing ways to ensure their own survival. In this case, increased competition following technological or deregulation shock will affect owner-manager agency conflict, potentially substituting for regulatory monitoring or other governance structures that encourage managers to act in shareholder interests. In addition, Jensen and Meckling (1976) and Demsetz and Lehn (1985) suggest regulators monitor managers, thereby effectively substituting regulatory oversight for managerial monitoring by directors. This implies that less regulatory monitoring leads to increased firm governance structures to control owner-manager agency conflict. Smith and Watts (1992) hypothesize that regulation limits the growth opportunities of regulated firms, which in turn, simplifies managerial jobs and reduces the need for strong governance structures. In support, Joskow, Rose, and Wolfram (1996) show that regulators discourage the use of stock option grants for CEOs. Therefore, if deregulation leads to an increased use of stock options, owner-manager incentives will tend to be better aligned with the interests of shareholders. Conversely, Jensen and Meckling (1976) suggest product market competition does not affect agency conflict created by the separation of ownership and control. Based on this argument it may be suggested that changes in competition stemming from technological or deregulation shock should not affect governance structure.

The empirical evidence investigating the effects of deregulation on the governance structures of deregulating firms generally indicate that firms move towards better governance structures. Kole and Lehn (1999) find evidence that deregulating the airline industry resulted in more concentrated equity ownership, higher CEO pay and options, and smaller boards. Crawford, Ezzell, and Miles (1995), Hubbard and Palia (1995), Bryan and Hwang (1997), and Bryan, Hwang, and Lilien (1999) find evidence that deregulating firms adopt stronger governance structures. Lehn (2002) provides evidence suggesting telecommunications firms adopt stronger internal governance structures post-1996. However, none of these studies explicitly control for trends in

dominance hypothesis, the *regulatory monitoring dominance hypothesis*, and the *substitution hypothesis* for various telecommunications industry segments.

3. Sample Selection and Methodology

3.1. Sample Selection

Our initial sample consists of all 93 publicly-traded telecommunications companies listed in *Value Line* between 1993 and 1999.¹ In Table 1 we present the *Value Line* definitions of telecommunication industry segments by Standard Industrial Classification (SIC) codes. After screening for available data on CRSP, Compustat, ExecuComp, and proxy statements our final sample consists of the 62 telecommunications firm-year observations for the pre-deregulation period (1993-1995), and 123 firm-year observations for the post-deregulation period (1997-1999). Our data requirements include financial and governance data for at least two years for each of the pre-deregulation and post-deregulation periods. The increase in observations between these periods reflects the dramatic increase in new entries into the telecommunications industry after the deregulation of 1996.

To control for contemporaneous trends among comparable industrial firms, such as those identified in Hubbard and Palia (1995), Kole and Lehn (1999), Milliron (2000), and Rennie (2006), we also construct a control sample of industrial firms. Following the procedure recommended by Barber and Lyon (1996) and Kothari and Warner (1997), we match by choosing firms with prior three-year average return on assets (ROA) within 10% of our sample firm and then select the industrial firm closest in size, as measured by the book value of total assets. Matching occurs for the first year each telecommunications firm enters the sample. To avoid survivorship bias, matched control firms are used only once. By following this procedure, we generate a control group of 62 firm-year observations for 1993-1995, and 123 for 1997-1999.

3.2 Methodology

This paper employs a two-part study design corresponding to our two objectives. In the first model we investigate how changes in product market competition affects governance structure for firms in the telecommunications industry. This multivariate model controls for other factors that could affect changes in corporate governance, including fixed effects to control for firm invariant omitted variables.

$$(1) \quad Govchar_{it} = \beta_{0i} + \beta_1 Dereg_{it} + \beta_2 Dereg_{it} \times Telecom_{it} + \beta_3 Age_{it} + \beta_4 Age_{it}^2 \\ + \beta_5 Size_{it} + \beta_6 Lev_{it} + \beta_7 MTB_{it} + \varepsilon_{it},$$

The dependent variable, $Govchar_{it}$, represents one of four governance characteristics; CEO ownership, CEO options proportion, board size, and outside directors. The independent variables include a deregulation indicator variable ($Dereg_{it}$), a

¹ Kole and Lehn (1999) compare governance structures of airlines with those of industrial firms and regulated utilities during the period 1971-1992, or 7 years before through 7 years after, and 7 years before through 14 years after, the Airline Deregulation Act of 1978. In this paper, we interpret medium- to long-term as 3 years before and 3 years after the Telecommunications Act of 1996.

We also find changes occur in the financial and governance structure characteristics of the sample firms between the pre-deregulation and post-deregulation periods. As shown in Table 3, Panel A, governance structure characteristics of both the sample of telecommunications firms and the matched sample of industrial firms changes during the 1990s. Stock ownership increases and board size decreases for both telecommunication and industrial firm CEOs. However, we find that CEO total pay, options grants, and the proportion of pay made up of options increase significantly after deregulation for the sample of telecommunications firms, but are unchanged for the matched sample. In sum, univariate evidence suggests a strengthening in governance structure characteristics for both telecommunication and industrial firms.

Summary statistics reported in Table 3, Panel B, also indicate that changes occur in the financial characteristics of telecommunications and industrial firms after deregulation. Both sets of firms realize an increase in size, increased leverage, and greater growth opportunities. However, the increase in firm size and growth opportunities are significantly greater for telecommunications firms. This highlights the acceleration of business opportunities for telecommunications firms due to deregulation.

We report multivariate, fixed effects evidence in Table 4. Consistent with the *regulatory monitoring domination hypothesis* we find evidence that telecommunication firms adopt governance structures that better control owner-manager agency conflict after deregulation. Specifically, in Column 2 we find that the proportion of CEO pay from option grants increases by 11.4 percent ($\beta_1 + \beta_2 = 0.114$, $p = 0.037$). Similarly, the board size regression reported in Column 3 indicates telecommunications firms reduce the size of their boards by 8.6 percent after deregulation ($\beta_1 + \beta_2 = -0.086$, $p = 0.008$).

However, we do not find an incremental increase for telecommunication firms above that for industrial firms. The coefficient, β_2 , reflects governance characteristic change for telecommunications firms adjusted for matched industrial firms. In Columns 2 and 3, the β_2 coefficients are not statistically significant. Moreover, it can be suggested based on evidence in Column 1 that CEO ownership increases for industrial firms after deregulation ($\beta_1 = 0.018$, $t = 3.81$), but not for telecommunication firms ($\beta_1 + \beta_2 = 0.004$, $p = 0.498$). Telecommunication firms have marginally less ownership ($\beta_2 = -0.014$, $t = -2.33$) than industrial firms after deregulation. Also, it is shown in Column 4 there is a higher proportion of outside directors for industrial firms ($\beta_1 = 0.034$, $t = 2.30$), but not for telecommunication firms ($\beta_1 + \beta_2 = -0.010$, $p = 0.551$).

In sum, the results in Table 4 suggest telecommunications firms tend to adopt governance structures that better mitigate principal-agent problems after deregulation, but do not keep pace with secular trends toward even stronger governance structures among comparable industrial firms. This finding is consistent with the *product market competition dominance hypothesis*, where increased competition dominates reduced regulatory monitoring. However, we acknowledge that the variation in the effects of industry shock among different industry segments may be a factor. This issue is investigated in the next section.

5. Telecommunications Industry Segment Evidence

We present univariate evidence for three segments in the telecommunications industry, equipment, service, and entertainment in Figure 2 and Table 5. In Figure 2 we see that product market competition increases for equipment and service firms, but remains relatively unchanged for entertainment firms. To assess the statistical

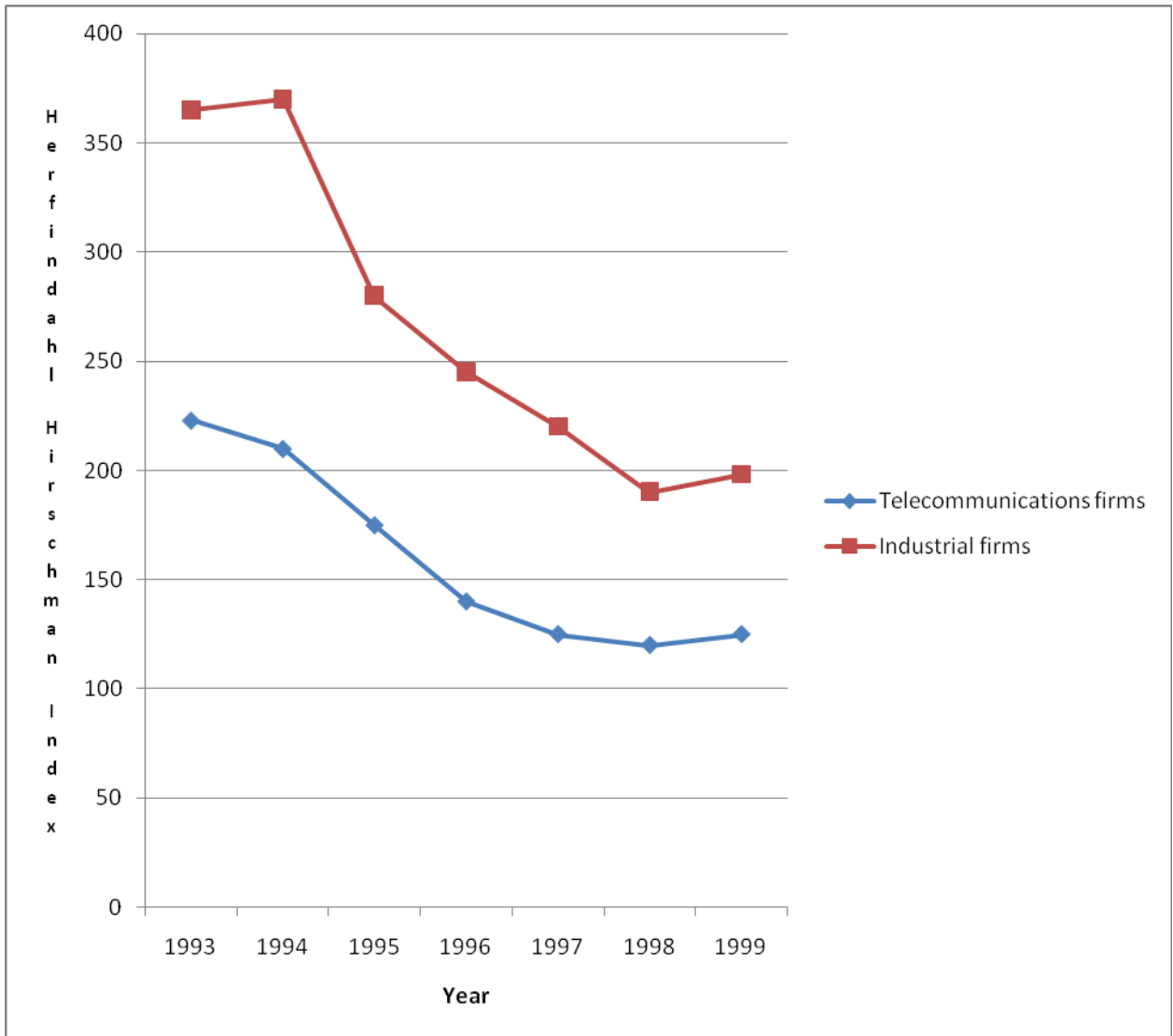
6. Conclusions

In this paper we investigate the association between product market competition and corporate governance structure change by documenting the effects of technological, competitive, and regulatory shock on telecommunications firms. In general, we find that telecommunications firms adopt governance structures that better control agency conflict, however these governance changes do not better control agency conflicts than those found for a control sample of industrial firms. However, we find that governance changes differ by industry segment and the competitive environment within that segment. For example, the equipment and service segment experience intensified competition in the aftermath of reduced regulatory monitoring, and correspondingly do not strengthen their governance structures relative to a matched sample of industrial firms. In contrast, entertainment segment firms experience reduced regulatory monitoring, but unchanged competition, and adopt stronger governance structures relative to the matched sample. We conclude that competition may substitute, not only for regulatory monitoring, but also for those corporate governance traits that mitigate owner-manager agency conflict.

These results have implications for understanding the relation between product market competition and governance structure change. Existing research on corporate governance dynamics focuses on the effects of deregulation shock on entire industries. A typical assumption is that deregulation leads to lower regulatory monitoring. However, prior studies do not consider the potential effects of contemporaneous changes in product market competition or the effects of variation in shocks across different segments that comprise an industry. Our paper shows that governance structures may respond to reductions in regulatory monitoring and corresponding changes in product market competition, and that various industry segments may be affected differently by shocks to that industry.

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Figure 1
Herfindahl Hirschman Index of Industry Concentration for Sample Telecommunications and Industrial Firms



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Table 1
Value Line Telecommunications Industry, Segments, and Standard Industrial Classification (SIC) Codes

Value Line telecommunications industry segment	SIC Code	SIC industry name	N (pre- 1996)	N (post- 1996)
Cable	4841	Cable and other Pay Television	0	5
Entertainment	2711	Newspapers: Publishing	0	0
	4832	Radio Broadcasting Stations	2	3
	4833	Television Broadcasting Stations	3	8
	7812	Motion Picture and Video Tape	0	3
	7900	Amusement and Recreational	2	3
Equipment	3357	Fiber Optic Cable	3	6
	3572	Computer Storage Devices	0	3
	3576	Computer Communications Equipment	0	2
	3661	Telephone and Telegraph Apparatus	5	12
	3663	Radio and TV Broadcasting Equipment	8	18
	3669	Communications Equipment	0	0
	3674	Semiconductors and Related	1	0
	7370	Services, Computer Programming	3	9
	7373	Computer Integrated System Design	0	0
Service	1623	Power and Communication Transmission	0	0
	4812	Radio/Telephone Communications	10	12
	4813	Telephone Communications	11	15
	4899	Communications Services	0	0
	7359	Equipment Rental and Leasing	0	2
	7389	Business Services	0	0
Wireless Network	3571	Electronic Computers	0	0
	3575	Computer Terminals	0	0
	7371	Computer Programming Services	0	3
	7372	Prepackaged Software	0	0
Other	1623	Water, Sewer, Pipeline Construction	1	3
	3060	Fabricated Rubber PDS, NEC	0	3
Total			49	110

Table 3
Governance and Financial Characteristics of Sample Firms

Mean (median) governance and financial characteristics of sample firm-year observations are shown. The sample consists of telecommunications and prior performance- and size-matched industrial firms for the pre-1996 (1993 through 1995) and post-1996 (1997 through 1999) periods for which data are available in CRSP, Compustat, ExecuComp, and proxy statements in Lexis Nexis or Global Access. There are 62 telecommunications firm-year observations and 62 industrial firm-year observations for the pre-1996 period, and 123 telecommunications firm-year observations and 123 industrial firm-year observations for the post-1996 period. Numbers of observations are shown below means. Mean difference in differences tests are also reported. Statistical significance is shown in bold.

	Telecommunications firms		Industrial control firms		Mean difference
	Pre-1996 (1)	Post-1996 (2)	Pre-1996 (3)	Post-1996 (4)	
<i>Panel A: Governance characteristics</i>					
CEO ownership	0.027** (0.001)^b	0.057** (.004)^a	0.020*** (0.003)^b	0.053*** (0.007)^a	-0.017 (0.2673)
CEO options proportion	0.248*** (0.102)***	0.425*** (0.481)***^c	0.190 (0.180)	0.260 (0.211)^c	0.288*** (0.0001)
Board size	11* (11)***	9* (8)***	10*** (10)**	9*** (9)**	2.118** (0.0013)
Outside directors	0.762 (0.786)**^b	0.703 (0.727)**^b	0.717*** (0.750)*^b	0.754*** (0.778)*^b	0.030 (0.1872)
CEO age	54 (55)	54 (56)^b	55 (54)	57 (57)^b	4** (0.0167)
<i>Panel B: Financial characteristics</i>					
Size	14,195*** (2,776)^c	25,447*** (3,542)^c	2,953*** (937)^c	5,523*** (524)^c	25,246*** (0.0001)
Leverage	0.228*** (0.204)	0.236*** (0.209)^b	0.240* (0.237)*	0.298* (0.313)*^b	-0.155*** (0.0001)
MTB	2.276*** (1.933)***^c	3.492*** (2.678)***^c	1.538* (1.425)^c	1.564* (1.337)^c	1.319*** (0.0001)
Stock returns	0.361* (0.275)^c	0.867* (0.412)^c	0.095*** (0.079)^c	0.089*** (0.008)^c	0.730*** (0.0038)
ROA	0.065 (0.062)	0.054 (0.070)^b	0.054 (0.060)*	0.037 (0.038)*^b	0.016 (0.2422)
<i>Panel C: Competition</i>					
Herfindahl-Hirschman Index	41.842*** (37.779)^c	39.930*** (12.301)^c	115.246 (48.849)^c	48.550 (44.880)^c	16.620 (0.5226)
Industry concentration ratio (4 largest firms)	0.642*** (0.675)^c	0.660*** (0.754)^c	0.782** (0.809)^c	0.761** (0.783)^c	-0.135*** (0.0007)
N	49	110	43	102	304

*, **, *** means (medians) differ for telecommunications firms, or for industrial firms, between the pre- and post-1996 periods, or significance of $Pr>|t|$ for differences in differences means tests, at the 10 percent, 5 percent, or 1 percent level.

^{a, b, c} means (medians) differ for the pre-1996 period, or post-1996 period, between telecommunications and industrial firms, at the 10 percent, 5 percent, or 1 percent level.

Table 5
Governance and Financial Characteristics of Telecommunications Firms by Industry Segment

Mean (median) governance and financial characteristics of sample firm year observations are shown. CEO total pay and CEO options grants are reported in thousands of 1997 dollars. Stock returns are one-year holding period stock returns net of value-weighted stock market returns. Return on assets is the three-year average of earnings before interest, taxes, depreciation, and amortization, all scaled by total assets. Other variable definitions are provided in Table 2. Numbers of observations are shown below means.

	Entertainment		Equipment		Service	
	Pre-1996 (1)	Post-1996 (2)	Pre-1996 (3)	Post-1996 (4)	Pre-1996 (5)	Post-1996 (6)
<i>Panel A: Governance characteristics</i>						
CEO ownership	0.050 ** (0.021)*	0.187 ** (0.145)*	0.030 ** (0.006)	0.033 ** (0.007)	0.007 (0.000)	0.010 (0.000)
CEO options proportion	0.294 (0.000)	0.279 (0.000)	0.215 ** (0.047)**	0.502 ** (0.550)**	0.309 ** (0.293)	0.424 ** (0.350)
Board size	9,750 (10)	8,958 (8)	9,321 (9)*	7,844 (7)*	13,161 (14)*	12,021 (11)*
Outside directors	0.620 (0.667)	0.657 (0.714)	0.790 ** (0.789)	0.747 ** (0.750)	0.782 (0.833)	0.762 (0.762)
CEO age	50 (51)	55 (55)	55 * (55)	54 * (56)	56 (57)	55 (57)
<i>Panel B: Financial characteristics</i>						
Size	14,899 * (2,890)	28,241 * (4,202)	6,599 (1,471)	14,683 (1,499)	34,148 * (22,164)	60,520 * (34,911)
Leverage	0.268 (0.217)	0.262 (0.256)	0.094 ** (0.100)	0.100 ** (0.019)	0.300 (0.335)	0.386 (0.355)
MTB	2.608 * (2.123)	5.750 * (2.805)	3.403 (3.323)	4.318 (3.010)	1.695 ** (1.644)**	2.405 ** (2.285)**
Stock returns	0.267 * (0.117)	0.758 * (0.451)	0.729 (0.698)	0.557 (0.156)	0.220 (0.186)**	1.249 (0.497)**
ROA	0.023 (0.017)	0.015 (0.027)	0.103 ** (0.092)	0.053 ** (0.085)	0.052 (0.059)	0.031 (0.054)
N	12	24	28	64	31	47

*, **, *** medians differ for the pre-1996 from the post-1996 period at the 5 percent, 1 percent level.

An Assessment of OECD Health Care System Using Panel Data Analysis

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Abstract

The health care delivery system of twenty five OECD nations is analyzed in this paper. This study seeks to assess the significance of various factors contributing to life expectancy and infant mortality for the 1990-2002 period. A fixed-effects panel data model was used to examine the factors influencing life expectancy and infant mortality. More specifically the impact of economic, institutional, and social factors in determining the dependent variables are measured and evaluated.

1. Introduction

Expenditure on health and healthcare has escalated considerably in the OECD countries especially due to advancement and dissemination in medical technologies, population ageing and rising public demand. Health expenditure as a percentage of GDP was around 8.5% in 2002. In 1984, the average per capita health care expenditure of the OECD countries was \$870 (with purchasing power parity adjustment). This figure rose to \$2144 in 2002. Relative to the overall mean of the OECD countries, per capita health care expenditure growth has doubled compared to economic growth in the U.S. over the past 20 years. Lately, due to concerns over national security, there is an increasing trend in the OECD nations to reallocate resources from health care spending to expenditures related to security threats.

Figure 1 shows the comparison of life expectancy and health care expenditures for OECD countries in 2002. While trying to minimize healthcare costs, both developed and developing nations are making an effort to improve access to and quality of health care services for their citizens. Thus, identifying the relative role of various factors contributing to health care outcome is essential in understanding the issue and devising relevant policies to address it.

The majority of research on OECD health systems has focused on correlations between health care expenditures and economic performance of the member countries. These studies attempted to assess factors contributing to health using qualitative measures. Quantitative studies on the subject are limited, and a majority of the existing studies have used either time series or cross section analysis.

The objective of this paper is to apply the panel data model to measure and assess the importance of factors determining the two commonly accepted measures of health care outcomes: life expectancy and infant mortality. In this study, the factors used as independent variables are divided into economic, institutional, and social aspects. The aim of the study is to look at the comparative significance of each of the factors in determining life expectancy and infant mortality. The rest of the paper is structured as follows: section 2 presents a literature review and section 3 outlines the data and empirical methodology. Section 4 discusses the empirical findings, followed by conclusions in section 5.

efficiency in life expectancy, but had done poorly in infant mortality, or visa versa. Evans et al. (2001), with a sample of 191 countries worldwide, conducted a comparative efficiency of national health care systems. Using life expectancy as health output, and health expenditures and average schooling as inputs, they conclude that increasing resources result in improved health. In addition, more efficient use of resources can also contribute to the overall health care of a nation. Shaw et al. (2005) investigates the impact on changes in life style and pharmaceutical expenditure on life expectancies among OECD countries. With a specified cohort of the population; i.e., males and females at the age of 40 (for the period of 1960-1999), they find that increasing pharmaceutical expenditure, lowering tobacco consumption and increasing fruit and vegetable consumption have noticeable and positive but different impact on life expectancies of the observed population.

3. Empirical Methodology

3.1. Data and Variables

The study uses annual data from OECD Health Data 2004. Countries under investigation include all OECD member nations except Korea, Luxembourg, Norway, Slovak Republic and Turkey. These countries were excluded due to many missing observations. The concentration of the paper is for the period of 1990-2002. Running a time series analysis of individual countries for 12 years is not statistically advisable (less than 30 sample size). So, we decided to pool the data and run a panel data analysis for 25 OECD countries.

The variables used in the regression and their definitions are given in this section. In the first regression, the dependent variable is life expectancy at birth for the total population. It was estimated using the unweighted average of life expectancy of men and women. Life expectancy represents the typical number of years that a person at that age can be anticipated to live, presuming that age-specific mortality levels stay constant. In the second regression, the dependent variable is maternal and infant mortality. It encompasses the number of deaths of children under one year of age that occurred in a given year, expressed per 1000 live births.

The independent variables used in the regressions are: medical technology (computed tomography scanners per million populations), health employment (practicing physicians' density per 1000 people), in-patient utilization per capita (number of acute care bed days), prevention immunization (% of measles children immunized 2000), total expenditure on health per capita (US\$ PPP), alcohol consumption in litres per capita, and educational level (school expectancy years). Table 1 and 2 provides acronyms, descriptions, expected signs, and justifications for using the variables in the two regressions. Like alcohol consumption, another common factor that influences health status of any nation is the prevalence of smoking. However, because of limitation on data availability, we are unable to include any proxy of smoking in our study. Also, we encountered similar constraint in incorporating measures of income inequality, i.e. GINI coefficient. As indicated earlier in the literature review, using real GDP per capita for capturing inequality between nations may not be appropriate for this study (see Bloom and Canning (2007) for details).

Parameter estimate of health employment (PHYS) was strongly significant (at 1% level) in influencing life expectancy and infant mortality in OECD countries. The empirical estimate of PHYS was the most significant in both regressions, which connote that the availability of the health care personnel is really crucial. This indicates that larger number of physicians means better access to health services - especially in rural areas, and shorter waiting times for medical attention, lead to better health care delivery. Thus, investment in health related human capital especially physicians and nurses has a greater impact on improving life expectancy and reducing infant mortality. Looking at the data, one observes significant differences in numbers of practicing doctors and nurses per 1000 population among OECD countries, ranging from less than two to more than four. Our empirical results indicate that scarcity of health related human capital will have a substantial adverse impact on life expectancy and infant mortality in many OECD countries.

Preventive immunization (IMMUNI) was significant (at the 1% level) in both the regressions. However, immunization plays a more important role in reducing infant mortality than increasing life expectancy. The data showed that on average OECD countries only spend less than 3 percent of total health expenditure on preventive health awareness programs². Our regression results suggest that even with current low health expenditure on preventive medicine, such investment have a relatively high impact on influencing life expectancy and infant mortality. According to the OECD Indicators 2005, awareness of better life-style alternative will significantly increase life expectancy. It is evident that 38% of people in OECD countries die because of heart diseases and strokes due to lack of public consciousness on diet, exercise and healthy food choice. In-patient utilization (PATIENT) as a proxy for health services utilized was a fairly important factor in the life expectancy regression but statistically insignificant in the mortality regression.

One would expect higher per capita health care expenditure would improve the overall health in the society. Our empirical results indicate that the level of health care expenditure among OECD countries has been an important factor in extending life expectancy but does not have much impact on lowering infant mortality. Alcohol consumption (in litres per capita aged 15 and over) (ALCO) is commonly regarded as one of the health risk factors in the health care literature. However, it is noteworthy that in our analysis, the estimates were not statistically significant at the 5% level in both regressions. Perhaps one argument could be the fact that the methods in measuring alcohol consumption differ across OECD countries as mentioned in the data. As expected, educational level (EDU), used as an indicator of health awareness, was significant at the 5% level in both the regressions.

Overall, the panel data regression results provide some useful information on the healthcare assessment. For life expectancy as a dependent variable, supply of physicians, inpatient hospital bed days, overall financing of the health care, technology, preventive care, and education level, have played an important role. Judging from the regression coefficients, we concluded that the most influential factor is hospital bed days, followed by supply of physicians and education level. The proxy for social factor, alcohol consumption was not statistically significant.

However, for the infant mortality regression, empirical results were somewhat different. Physician supply, immunization and education are factors that were

² Health at a Glance - OECD Indicators 2005 can be found at <http://www.oecd.org/health/healthataglance>

More specifically the impact of economic, institutional, and social factors in determining the dependent variables are measured and evaluated.

The majority of research papers on national health care systems have concentrated on the two commonly accepted outcomes, life expectancy and infant mortality. However, the OECD-focused studies tend to assess cross variations of the health outcomes among individual member nations. The limited number of existing studies that concentrated on the factors influencing life expectancy and infant mortality had some drawbacks. The studies were limited in their approach (qualitative) or scope (either time horizon or the number of countries investigated). In this paper, we attempted to address the shortfalls mentioned above.

The selection of life expectancy and/or infant mortality as a proxy for health care outcome poses a challenge for researchers in the field. It has been noted that while a nation is receiving high marks for its achievements in prolonging life expectancy, they may be marginal on the infant mortality gains. This is of particular concern when such measures are used for international comparisons. For example, Mirmirani and Mirmirani (2005) consider the same health care outcomes as in this study and ranks efficiencies of OECD members. The study suggests that there may not be a correlation between the two outcomes. As a remedy, future research needs to concentrate on a single, uniform yet comprehensive health care outcome that is constructed from the available data.

Table 1: Variables, Descriptions, and the Relationships with Life Expectancy

Acronym	Description	Expected sign	Rationale
TECH	Medical technology -- computed tomography scanners per million population	+	CT scan is a proxy for better access to disease diagnosis, thus higher life expectancy.
PHYS	Health employment -- practicing physicians density /1000	+	Higher physician's density, better health care for society.
PATIENT	In-patient utilization-- acute care bed days number per capita	-	High in-patient utilization indicates poor health, which means lower life expectancy.
IMMUNI	Prevention Immunization-- measles % children immunized 2000	+	Immunization is a preventive measure, increases life expectancy.
HEXP	Total expenditure on health per capita (US\$ PPP)	+	Higher health expenditure will improve health services available, thus higher life expectancy.
ALCO	Alcohol consumption litres per capita (age 15+)	-	High alcohol consumption implies high health risk, less life expectancy
EDU	Educational level School expectancy Years	+	Higher literacy rate increases health awareness, therefore longer life expectancy.

Table 3: Empirical Results of Life Expectancy

	Coefficient	T-Statistics
TECH	0.0349**	2.189
PHYS	1.2245***	4.806
PATIENT	-1.5172***	-4.835
IMMUNI	0.0213**	2.551
HEXP	0.0004**	2.015
ALCO	-0.0031	-0.040
EDU	0.1851***	4.322
R ²	0.9845	
Adjusted R ²	0.9796	
F-Value	202.28 ***	

Note: ***, and ** denotes significance at the 1%, and 5% levels respectively.

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The Economic Freedom Index as a Determinant of Firm Births and Firm Deaths

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Abstract

We investigate the relationship between economic freedom, firm formation and firm deaths in the U.S. states. Economic freedom should be positively and significantly correlated to business formation, and significantly related to firm deaths. We find that policy selection leads to more or less economic freedom; as freedom increases, entrepreneurs start new ventures. Furthermore, more economic freedom leads to more firm failures, as a result of increased competition.

Introduction

Entrepreneurship's role in economic development has been widely established (Sherman & Chappell, 1998). Much of the entrepreneurship literature in the popular and in the academic press focuses on the creation of new ventures to meet the needs of prospective buyers in the market. The creation of these new ventures naturally raises many questions. Among them is the question of what are the determinants of new firm formation. Academics have wrestled with this issue for decades, especially as improvements in statistical software packages have allowed researchers to consider increasingly complex models (Acs & Storey, 2004).

The literature has identified several factors as key determinants of new venture formation (Sutaria & Hicks, 2004, Kreft & Sobell, 2005). These determinants include, but are not limited to, per capita bank deposits, unemployment level (Reynolds, Story, & Westhead, 1994; Ritsila & Tervo, 2002), local market demand (Reynolds, 1994), technology (Shane, 2001), and industrial restructuring (Sutaria & Hicks, 2004), among many others (See Acs & Storey, 2004, Wagner & Sternberg, 2004, Johnson & Parker, 1996). Research has also emphasized the spatial variations in business formation rates (e.g., Johnson, 2004). These variations in business formation rates occur across countries as highlighted by the Global Entrepreneurship Monitor (GEM) Studies (Reynolds, Bygrave, Erkko, & May, 2002), as well as within countries (Reynolds et al., 1994).

The purpose of this paper is to investigate the relationship between economic freedom and new firm formation, also called entrepreneurial activity in the literature (See, e.g., Kreft & Sobell, 2005). Economic freedom is measured as a combination of favorable legal institutions and tax and regulatory policies. First, we briefly describe the literature on determinants of entrepreneurship and economic growth. Then, using the work of Kreft and Sobel (2005) as a point of departure, we evaluate the relationship between economic freedom and firm deaths and firm births for each of U.S. States for the period 1990–2001. In the following section, we describe the results of our analysis.

freedom index (e.g., Kreft & Sobel, 2005; Doucouliagos & Ulubasoglu, 2006) as an effective means to evaluate income determination.

Karabegovic, et al., choose to group ten variables—usually expressed as ratios of GDP—into three categories: size of government; takings and discriminatory taxation; and labor market freedom. For *size of government*, the authors measured general consumption expenditures by government as a percentage of GDP, transfers and subsidies as a percentage of GDP, and Social Security expenditures as a percentage of GDP. For *takings and discriminatory taxation*, the authors measured total government revenue from own source as a percentage of GDP; top marginal income tax rate and the income threshold at which it applies; indirect tax revenue as a percentage of GDP; and sales taxes collected as a percentage of GDP. They rate top personal income tax rates by the income thresholds at which they apply, where higher thresholds result in a better score. Karabegovic, et al., surmount the criticism that they are a double counting by using both sides of the government balance sheet by examining sub-national jurisdictions. Due to extensive and unequal intergovernmental transfers, the link between taxation and spending is broken. For *labor market freedom*, the authors measure minimum wage legislation, government employment as a percentage of total state employment, and union density. A number of factors affect union density, notably laws and regulations, size of government employment, and manufacturing density. Government employment is excluded, and the effect of government employment is held constant in calculating the variable. The size of the manufacturing sector has an insignificant effect on union density. Please see Karabegovic, McMahon, and Mitchell, (2005) for a discussion of why these variables were included and others excluded.

Karabegovic, et al., construct a scale from zero to 10 to represent the underlying distribution of the 10 variables in the index, with higher values indicating higher levels of economic freedom. Thus, the freedom index is a relative ranking of economic freedom across jurisdictions and across time. In the final construction each area was equally weighted and each variable within each area was equally weighted.

In much of this literature, the relationship between freedom and entrepreneurship is not fully specified. Kreft and Sobel (2005) address this issue, albeit using a different methodology than do we. They argue “that a state’s underlying economic freedom is an essential determinant of the state’s ability to create and attract entrepreneurial activity. Put simply, an environment of low taxes, low regulations, and secure property rights (as measured by the economic freedom index) is what is necessary to encourage growth in entrepreneurial activity” (Kreft & Sobel, 2005, p. 608). Their research supports their contention that the economic freedom index is significantly related to entrepreneurial activity for the years of their study (1996 – 2000). While their research represents an important step in evaluating whether economic freedom will lead to more entrepreneurial activity, we believe their dependent variable may understate the relationship. In particular, they do not measure firm creation, but rather use annualized growth rate in sole proprietorships as their independent variable. We use a more conventional measure of entrepreneurial activity, the births and deaths of businesses. In addition, we propose to study the relationship over a longer period of time, an improvement suggested by Acs and Storey (2004).

Model, data and variables

Thus, rather than apply the freedom index to the question of income determination, we choose to apply it to the question of new firm formation as did Kreft

Ag-Mfg = Combined percentage of gross state product accounted for by agriculture and manufacturing.

Age = natural log of median age of the state's population.

Minority = combined percentage of African Americans and Latinos in the state's population.

C & I = natural log of commercial and investment lending per firm

Pop Den = natural log of population density

U Rate = state unemployment rate.

Empl yee = natural log of average number of employees per firm.

Table 1 presents summary statistics and correlation coefficients for these variables.

To capture the full potential relationship between the freedom index and new firm formation, we use the number of business births as a percentage of total businesses by state. Observing cross-sectional differences in firm births and deaths, Johnson and Parker discuss the need to scale the dependent variable to account for differences in the economies of the cross-sectional units. For example, directly comparing the number of firms formed in North Dakota with the number of firms formed in California would be inappropriate due the vast size differences of these states' economies. Johnson and Parker (1994, 1996) also demonstrate that researchers cannot study firm births and firm deaths in isolation. They argue that firm births (or deaths) may create spill-over effects, such as when a new retail business in a strip shopping center decreases the likelihood of other firms in the center failing. They also argue that firms directly compete with one another, and the arrival of a new competitor often means the demise of an incumbent firm. Lastly, they argue that nearly all firms have a finite life-span: a firm is formed, possibly it thrives for a while, but then the same firm dies. *A priori*, they are agnostic as to which effect will prevail, but they are adamant that firm births and firm deaths be studied together.

Otherwise, our model is an amalgam drawn from the economic freedom literature and the firm formation literature. On the one hand, it is essentially a derivative of traditional growth models (e.g., Solow, 1956) applied in a different context. Such growth models are common in the literature on freedom indices (e.g., Dawson 1998, 2006; Gwartney, Lawson, & Holcomb 2004, 2006). Similar to those models, we include income and population density (a proxy for the labor force) as explanatory variables. Also similar to those models, we include capital investment via a proxy measure, the volume of commercial and industrial loans in a state. We also include the unemployment rate, and the average number of employees per firm, as well as the combined percentage of GSP accounted for by agriculture and manufacturing. These variables are also similar to firm birth and firm death models such as those of Johnson and Parker (1994, 1996), and as reviewed in Keeble, Walker, and Robson (1993).

Similar to factors identified in Keeble, Walker and Robson (1993), we include the median age of each state's population, and the combined percentage of African Americans and Latinos in the state's population. Keeble and Walker (1994), Black, De Meza and Jeffreys (1996), and Johnson and Parker (1996) include variations in the amount of net housing wealth per cross-sectional element. The general argument is that housing equity provides collateral to back commercial lending in support of a business start-up. Similarly, as an independent variable, we include the dollar volume of all commercial and industrial loans by all FDIC-insured institutions by state per year.

Dawson (1998, 2006) and Gwartney, Holcombe, and Lawson (2004, 2006) discuss the direct versus the indirect effects of economic freedom on economic outcomes.

populations to patronize minority businesses. As the minority percentage grows, small business owners may have a larger market for their business. Firm deaths are conditioned on the state's unemployment rate. Higher unemployment rates, an indicator of state economic conditions, are associated with more business failures.

As hypothesized, more economic freedom leads to more business venturing. Freedom has a positive and significant impact on firm births. However, observation of Models 2 and 3 in Table 3 and combined with the evidence in Table 2 indicates that Freedom has both a direct and an indirect effect on business venturing. The direct effect of Freedom is that more economic freedom is directly related to greater business venturing activity. This is consistent with the Kreft and Sobel (2005) argument that greater economic freedom permits would-be entrepreneurs to more easily identify and act upon potential market opportunities. Economic freedom also has an indirect impact on business venturing through its impact on income. Consistent with the general body of the literature, economic freedom has a positive impact on income. In turn, higher incomes spur more business venturing.

Also as hypothesized, economic freedom has a significant impact on business dissolution as well. Over our sample, the coefficient on Freedom was positive and strongly significant. That is, as economic freedom increases, there are more business failures as well as more business births, *ceteris paribus*. As we argued might be possible, operating from the Schumpeterian view of entrepreneurial creative destruction, an economically free environment is consistent with wide-open competition. As a result of this competition, many existing firms or entrepreneurial ventures do not survive.

Concluding Remarks

Our findings support the hypothesis that state governments' policy selection leads to more or less entrepreneurial activity within a state; as economic freedom increases due to favorable government policies, entrepreneurs are more likely to start new ventures over the eleven-year period of our study (1990–2001). Furthermore, more economic freedom leads to more firm failures, as a result of increased competition.

These findings also support the contention that where one chooses to start a new business venture may have a profound impact on whether one is successful. (Sorenson & Audia, 2000) Given the relative spatial immobility of entrepreneurs (Wagner & Sternberg, 2004), entrepreneurs would be wise to carefully consider whether they are starting a new business venture in a state that has the economic freedoms necessary to initiate the business. We also suggest that it is incumbent upon state-level public policy makers to consider the impact their policies will have on economic freedom, as economic freedom is one determinant of the ability of nascent entrepreneurs to start a new firm or for existing entrepreneurs to thrive in their state.

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Table 1: Summary Statistics and Correlation Coefficients

Variable	Obs	Mean	SD	Min	Max
Births	650	12.044	1.848	8.029	21.279
Deaths	650	10.643	1.256	7.899	15.033
Freedom	650	6.916	0.695	5.100	8.400
Income	650	5.119	0.715	4.628	10.264
Ag-Mfg	650	18.852	7.035	2.774	33.873
Age	650	3.534	0.061	3.266	3.671
Minority	601	16.672	11.997	0.979	49.766
C & I	500	4.308	0.789	1.432	7.723
Pop Den	650	4.243	1.363	-0.192	6.880
U Rate	500	4.817	1.472	1.600	10.500
Employee	649	2.781	0.154	2.284	3.079

	Births	Deaths	Freedom	Income	Ag-Mfg	Age	Minority	C & I	Pop Den	U Rate	Employee
Births	1										
Deaths	0.778	1									
Freedom	0.275	0.221	1								
Income	-0.095	-0.014	0.046	1							
Ag-Mfg	-0.317	-0.464	0.142	-0.238	1						
Age	-0.206	-0.035	-0.113	0.079	-0.071	1					
Minority	0.376	0.432	0.193	0.067	-0.228	-0.178	1				
C & I	-0.337	-0.303	-0.087	0.127	0.074	-0.005	-0.08	1			
Pop Den	-0.256	-0.142	0.125	0.219	0.14	0.261	0.18	0.372	1		
U Rate	0.154	0.225	-0.421	-0.157	-0.082	-0.169	0.14	-0.081	0.017	1	
Employee	0.033	0.078	0.412	0.19	0.213	0.062	0.23	0.311	0.598	-0.151	1

Table 3: Birth Models

Dep. Var: Births						
	<u>Model 1</u>		<u>Model 2</u>		<u>Model 3</u>	
Freedom			0.939	*		
			<i>1.82</i>			
Income					9.469	*
					<i>1.87</i>	
Deaths	-0.258	***	-0.200	***	-0.291	***
	<i>-3.58</i>		<i>-3.32</i>		<i>-3.9</i>	
Ag-Mfg	0.009		0.007		0.015	
	<i>0.45</i>		<i>0.4</i>		<i>0.8</i>	
Age	-0.482		-0.511		-0.149	
	<i>-0.44</i>		<i>-0.47</i>		<i>-0.13</i>	
Minority	0.026		0.053	**	0.053	**
	<i>0.89</i>		<i>2.43</i>		<i>2.28</i>	
C & I	0.055		-0.009		0.002	
	<i>0.96</i>		<i>-0.16</i>		<i>0.03</i>	
Pop Den	2.342	*				
	<i>1.71</i>					
U Rate	-0.053	88%	0.011		0.020	
	<i>-1.59</i>		<i>0.25</i>		<i>0.41</i>	
Employee	-0.508		-0.912		-4.334	89%
	<i>-0.3</i>		<i>-0.62</i>		<i>-1.61</i>	
Constant	6.841		10.552	*	-21.621	
	<i>0.840</i>		<i>1.76</i>		<i>-1.05</i>	
Instrmntd: Instrmnts:			Freedom Income Pop Den		Income Freedom Pop Den	
R-sq:	0.76		0.75		0.72	
F-stat	64.59		71.25		63.37	

All models estimated with year effects and robust standard errors; t-statistics in italics

*-Significant at 90%, **-Significant at 95%, ***-Significant at 99%

A Cross-Country Analysis of the Employment Intensity of Economic Growth

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Abstract

In this paper, we examine the relationship between economic growth and employment in six developed nations from 1990 to 2006. Models are developed to estimate the employment intensity of economic growth within each nation. Among those for whom a significant relationship was found, employment intensity is estimated to range from 0.14 to 0.33. Once the model is augmented to account for persistence in employment growth, employment intensity diminished in a majority of the nations, but remained significant in most, ranging from 0.16 to 0.33. The model was further modified to examine the dynamic nature of the relationship between employment and economic growth using impulse response analysis. As before, differences in the responsiveness of employment to economic growth are found between the nations studied. Reasons for the differences in the employment intensity of economic growth between nations are discussed. Evidence is found suggesting that nations with high labor force growth rates and/or relatively large service sectors tend to exhibit higher levels of employment intensity of economic growth.

Introduction

During the 1990s, several nations experienced moderate economic growth with little increase in employment while other nations with similar growth rates experienced higher levels of job creation. During the first year of the most recent economic recovery in the US (2002), employment actually fell. Several explanations have been suggested as to why this may occur. Perhaps the recovery was uneven and the growing sectors of the economy increased the utilization of labor rather than increase the number of jobs. Also, coming out of a recession, companies are thought to be reluctant to hire many more workers until they are convinced about the sustainability of a new economic recovery. Another possibility is that companies employed new technologies, resulting in increased productivity instead of more employment.

In this paper, we examine the relationship between economic growth, as measured by real GDP, and employment in the G7 nations for which comparable data were available¹. A review of the existing literature on the topic is undertaken to provide both the underpinnings of the relationship as well as the context for the current research. Both the employment intensity of economic growth and the persistence of employment growth are estimated. Next, some of the factors that help explain the differences between nations are explored.

The period of this study begins in 1990 and ends in the third quarter of 2006. The statistical properties of each variable (the growth rates of employment and real GDP) are examined. Empirical models are then developed to estimate the employment intensity of economic growth. Employment intensities (the elasticity of employment with respect to real GDP) are estimated to range from 0.14 to 0.33 in the nations considered for whom a significant relationship was found. Once the model is augmented to account for

¹ Comparable data were not available for Japan.

Descriptive Statistics

Quarterly data from 1990 to 2006 for both national employment and real GDP were obtained from *OECD Statistics*². As can be seen in table 1, the nations exhibited different patterns of economic growth during the study period. Italy had the slowest average quarterly growth in GDP of 1.38% (measured at an annualized rate) while the US had the highest rate, 2.89%. Canada, like the US, experienced relatively high economic growth while France and Germany experienced similar economic growth rates averaging about 1.8% and 1.9%, respectively. Germany experienced the least average growth in employment (just under 0.2% per quarter at an annualized rate) while the Canada and the US saw employment growth rates averaging in excess of 1%.

Table 1a
Descriptive Statistics: Economic Growth

	Mean	Median	Standard Deviation
Canada	2.61%	2.63%	2.42
France	1.81%	2.01%	1.72
Germany	1.92%	1.52%	3.06
Italy	1.38%	1.45%	2.01
United Kingdom	2.35%	2.64%	1.76
USA	2.89%	2.93%	2.07

Table 1b
Descriptive Statistics: Employment Growth

	Mean	Median	Standard Deviation
Canada	1.42%	1.40%	1.62
France	0.72%	0.68%	1.34
Germany	0.19%	-0.09%	1.95
Italy	0.53%	0.77%	2.87
United Kingdom	0.42%	0.93%	2.16
USA	1.24%	1.24%	1.47

Methodology and Empirical Results

Similar to Boltho and Glynn (1995) and Padaline and Vivarelli (1997), the employment intensity of economic growth is estimated using the following model:

² OECD Statistics can be found at <http://stats.oecd.org>

In the augmented model, B_1 represents the *partial* elasticity of employment while B_2 is an estimate of the degree of persistence of employment growth. By persistence, we mean the relationship between past and current employment growth; in other words, does employment growth have momentum such that periods of positive growth are followed by further growth while periods in which employment growth declines tend to be followed by further declines? By ignoring the potential effect of lagged employment growth, the previous studies may have obtained misleading results. Equation (2) was estimated in a similar manner to the original model.

Table 3
Model with Economic Growth and Lagged Employment Growth

Nation	constant	Economic growth	Lagged employment growth
Canada	0.03	*** 0.21	*** 0.50
France	-0.003	*** 0.23	*** 0.45
Germany	-0.03	0.08	0.16
Italy	** 0.20	-0.10	* 0.18
UK	-0.07	*** 0.33	** 0.19
US	0.07	*** 0.16	*** 0.35

where *** indicates significance at the 1% level; ** indicates significance at the 5% level and * indicates significance at the 10% level

Coefficients on lagged employment growth were positive and significant in five nations, with estimates ranging from a low of 0.18 in Italy to a high of 0.50 in Canada (for those nations for which a significant result was found). Augmenting the model to include lagged employment growth provides further insight into the relationship between employment growth and economic growth. The degree of persistence seems to be a significant factor in explaining employment growth in virtually every nation.

Compared to the model without lagged employment growth, the elasticities of employment with respect to real GDP declined somewhat in several cases. Employment elasticity became noticeably smaller for France and insignificant for Germany. Thus, the omission of lagged employment growth appears to have led to a positive bias in some of the estimated elasticities.

Dynamic Model of Employment and Economic Growth

Building on the model specified in (2), the appropriate lag structure of both employment and economic growth are determined followed by an impulse analysis to identify the total response of employment to economic growth as opposed to just one period. The model takes the form:

$$\text{empgrowth} = B_0 + B_{1i} \text{ economic growth}(t-i) + B_{2j} \text{ empgrowth}(t-j) + \varepsilon \quad (3)$$

Figure 1

Canada: Response of Employment to an Innovation in Economic Growth

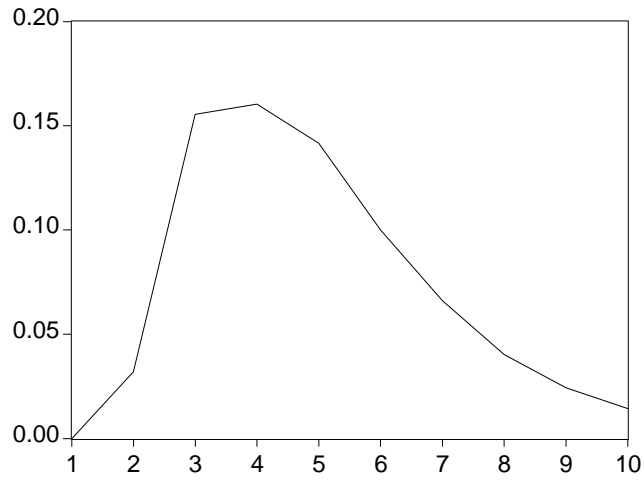
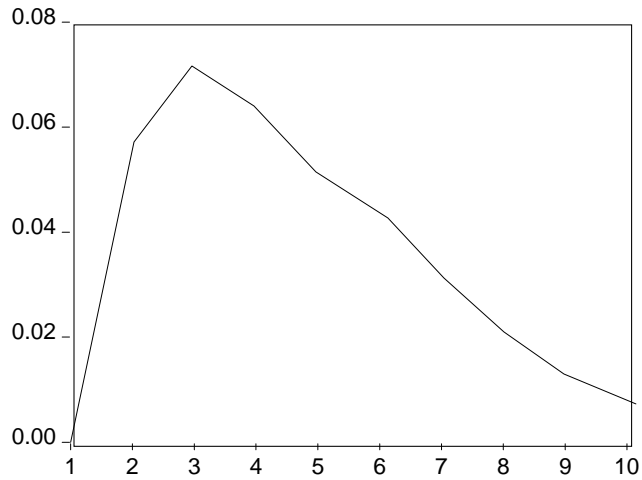


Figure 2

France: Response of Employment to an Innovation in Economic Growth



As can be seen from the above figures, Canada, the UK and the US display the largest response of employment to economic growth while France and Germany show the smallest response (recall Italy had an insignificant relationship). This supports the earlier findings which indicated that Canada, the UK and the US displayed the largest responses of employment to economic growth while France, Germany and Italy showed the smallest response (or in the case of Italy, an insignificant response).

Reasons for the Differences in Estimated Employment Elasticities

Previous studies suggest several characteristics of the labor market that may influence the employment intensity of economic growth. In particular, the growth of the labor force and the relative size of the service sector help explain differences in employment elasticities. Walterskirchen (1999) found that increases in the labor supply tend to raise employment but reduce productivity. As a result, the employment intensity of economic growth increases. Mourre (2004) finds that the job intensity of growth is highest in the service sector – once again likely due to slower growth in productivity in services. Table 5 shows the growth of the labor force and size of the service sector in each of the countries for which comparable data were available.

Table 5
Characteristics of Labor Market

Nation	Growth in Labor Force, 1990-2006	Service Sector Employment as a Percent of Total Employment in 1990
Canada	23%	72%
France	11%	N/A
Germany	1%	55%
Italy	0.6%	58%
UK	3.9%	68%
US	13.7%	71%

The two nations with the slowest growth in their labor force had either insignificant (Italy) or the lowest employment elasticity (Germany). Meanwhile, the nations with the highest labor force growth rates (Canada and the US) had two of the three highest employment elasticities. In addition, the nations with the three largest service sectors (Canada, UK and US) also had the highest employment intensity of economic growth while those with the smallest service sectors (Italy and Germany) had the lowest or insignificant levels of employment intensity⁴. Together, this lends support to earlier findings that provided evidence that the characteristics of the labor market helped explain differences in the employment intensity of economic growth.

⁴ Comparable data for service sector employment were not available for France.

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Financial Statements, Attestation Level and Lending Decision by Small Banks

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Abstract

The loan decision model of small banks is known to differ from loan decision model of large banks. This study focuses on small banks and examines whether financial statements are an important consideration in the loan decision and whether the level of attestation affects loan officers' perception of the importance of those financial statements. The survey results of 55 loan officers from 6 small banks indicate that while financial statements are perceived as important information in the loan decision of small banks, loan officers may not adequately consider the credibility of the financial statements when evaluating loans.

Introduction

Lending to small businesses constitutes an important area of research in finance. Small business borrowers tend to be more informationally opaque than their larger brethren and thus pose greater challenges to lenders (Cole, et al., 2004; Berger and Udell, 2006). It is well known that commercial banks use both financial and non-financial information for their loan decision making. Novice loan officers are generally taught to seek and organize information using a framework called the five C's of credit (character, capacity, capital, conditions, and collateral), giving a common structure to their judgments (Beaulieu, 1994). However, large banks rely more on hard financial information, computer-based financial models and centralized decision making, as a basis for their loan decision, while small banks whose loan clients are mostly small business borrowers rely more on non-financial information collected by personal contact, community ties and close lender-borrower relationships. As large banks have more branches that are more geographically dispersed than do smaller banks, it becomes more difficult for the top management of large banks to monitor the behavior of employees, and agency problems arise (Jensen and Meckling, 1976). To ensure that loans are evaluated in an appropriate manner, large bank managers develop loan approval systems that employ readily available and verifiable information about the loan applicants, such as financial statements information. In contrast, small banks face agency and control problem that are less severe than large banks. Small banks are likely to have private non-financial information about borrowers because small banks have a better understanding of local business and economic conditions through informal meetings and conversations with customers (Feldman, 1997).

Cole, Goldberg, and White (2004) found evidence that the lending decisions of large banks are more likely to be a function of financial variables, whereas the lending decisions of small banks are more likely to be a function of variables indicating pre-existing relationships between the bank and loan applicants. Many other studies confirm our understanding that non-financial information is important in the lending decision of small banks. (Cowen and Page, 1982; Whiteman, 1998; Cole, 1998; Berger and Udell, 1995; Berger and Udell, 2002; Elyasiani and Goldberg, 2004; Ebben, 2004; Berger et al., 2005).

review and audit. Each level of service results in a different level of assurance and an appropriate accountant's report. The Statements on Standards for Accounting and Audit Services (SSARS) 1 issued by the Accounting and Review Services Committee of AICPA clearly states the different level of assurance among these three services. The compilation report provides statement users no assurance. The review report offers limited assurance. The highest level of assurance is provided by the audit report.

When loan officers consider financial statements in a lending decision, they should find that audited financial statements are more credible than reviewed financial statements and, in turn, reviewed financial statements are more credible than financial statements compiled by a CPA or prepared by the borrower. Three prior studies considered different levels of auditor attestation associated with financial statements. Bandyopadhyay and Francis (1995) presented loan officers with a commercial loan application that included financial information. Three different case versions included compilations, reviews, and audit reports. Using loan officers as subjects, they found that both the decision to lend and the interest rate to be charged were related to the level of attestation. Higher loan approval rates and lower interest rates were associated with audited statements.

Two other studies, however, reported conflicting findings. Johnson, Pany and White (1983) asked loan officers to evaluate financial statement information, approve a loan, and determine an interest rate. Four levels of attestation were provided: no attestation at all, compilation, review, and audit. The results of their study indicated that the level of attestation had no economic effect on either the loan acceptance or interest rate decision. Wright and Davidson (2000) examined the effect of auditor attestation on commercial lending. Results of their study indicated that auditor attestation had no effect on risk assessment, and, in turn, on the decision to recommend the loan.

Initial interviews with senior officers of small banks also revealed that audited financial statements are rarely required for a loan application in small banks. Small business borrowers' ability to use audit-level services is limited because audits are often prohibitively expensive (Martin et al. 1988). During the initial interview, a bank officer mentioned that the high cost involved in auditing and the competition among small banks prohibit those banks from requiring audited financial statements. Other officers stated that compilation by a CPA is sufficient for a loan evaluation in small banks. They suggested that rather than assessing the credibility of financial statements through independent attestation services, they evaluate the credibility of financial statements by judging the credibility of the borrower who provides them. Based on the previous conflicting research results, a second research hypothesis is tested in the null form.

H2: The level of attestation has no significant difference in the perception of the importance of financial statements in the lending decision of small banks.

A possible reason why the level of attestation has no effect in the loan decision by loan officers is suggested by Waterston (1979): loan officers may not understand the differences among audits, reviews, and compilations. Wright and Davidson (2000) proposed training and educating loan officers to explain the difference among audits, reviews, compilations and information prepared by management. If we assume that training and education are effective methods of teaching loan officers such knowledge, the response of loan officers who have more banking experience and those with a business degree may be different from those of loan officers with less experience and those with non-business degrees. Loan officers with more banking experience might have

structure of the business and client’s personal net worth—were selected from the study of Page, Trombetta and Werner (1977). Respondents were instructed to record their opinion on the importance of loan decision variables on a seven-point scale ranging from “not at all important” to “extremely important.” Respondents were asked to assume that the borrower applied for a commercial line of credit loan that is significant in dollar amount, but less than the respondent’s legal lending limit. From the initial interviews with senior bank officers, authors found that most commercial line of credit loans are less than two million dollars. Respondents were assured of complete anonymity and were requested to disregard whether such data including financial statements attested by a CPA is required by any other parties including regulatory agencies.

Research Results

To test the importance of financial statements in the lending decision, the overall means for considerations in lending decision was calculated. The results are presented in the Table 2. Three non-financial variables—loan purpose, collateral and years in current business—were the three top-ranked considerations in the lending decision. These three variables were identified as very important by the senior officers whom the authors interviewed. The importance of personal collateral in relationship lending was also found in the study by Brick and Palia (2007). Financial statements with CPA involvement—whether audited, reviewed or compiled—were also perceived as important considerations. The mean scores of the first three non-financial variables and the second three financial statements variables are not statistically different. Other information like nature of the business, tax return, credit scores and physical observation of the business are perceived as important information in the loan decision of small banks. Client education, client race/nationality and client gender were not considered as important in the loan decision. Therefore, H1 is supported.

Table 2
Mean Scores of Consideration in Lending (Overall)

Consideration	Mean
Loan purpose	6.20
Collateral	6.18
Years in current business	6.07
F/S audited by CPA	6.01
F/S reviewed by CPA	5.98
F/S compiled by CPA	5.94
Nature of business	5.94
Tax return	5.90
Client credit score	5.89
Physical observation of business	5.81
Client personal net assets	5.63
Guarantor	5.56
Other business experience	5.49

Collateral	6.23	6.13	6.23	6.12
Years in current business	6.23	5.93	6.16	5.96
F/S audited by CPA	6.03	6.00	6.10	5.92
F/S reviewed by CPA	6.00	5.96	6.03	5.92
F/S compiled by CPA	5.69	6.17	5.83	6.08
Nature of business	5.96	5.93	5.96	5.92
Tax return	5.96	5.86	5.83	6.00
Client credit score	5.96	5.82	5.80	6.00
Physical observation of business	5.80	5.82	5.83	5.80
Client personal net assets	5.88	5.41	5.66	5.60
Guarantor	6.00	5.17	5.73	5.36
Other business experience	5.61	5.37	5.43	5.56
Reputation of client	5.26	5.00	4.96	5.32
F/S prepared by client	4.69	5.27	4.86	5.16
Legal structure of business	4.65	4.75	4.73	4.68
Client education	3.69	3.79	3.73	3.76
Client race/nationality	1.98	1.75	2.00	1.52
Client gender	1.80	1.65	1.83	1.60

Scale
 1 Not at all important
 4 Neutral
 7 Extremely important

Table 4
Results of t-tests (Difference in Experience)

Consideration	t-value
F/S prepared by client	2.06*
F/S compiled by CPA	2.10*
Experience in current business	2.03
Client personal net worth	2.26*
Guarantor	4.89**

* p<.05, one tailed test

** p<.01, one tailed test

Conclusions

The results of this study provide evidence that financial statements information is perceived as important information used in the loan decision of small banks when those statements have CPA involvement. The finding of previous studies that small banks rely heavily on non-financial information is also confirmed in this study.

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The Economic Potential of the Arkansas Sweet Potato Industry: Some Evidence from Dallas

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Abstract

This paper examines the Arkansas sweet potato industry, which appears to have succeeded in moving the market for its agricultural product from the traditional perfect competition to monopolistic competition. Transport costs are found to play a major role in getting the product to market. Since Arkansas is unlikely to be able to economically compete directly with producers from much larger entities such as California and China, the fact that marketing and distribution differentiators have been used to turn around what was considered a dying industry is somewhat remarkable. The authors hope that this industry will serve as a success story for product differentiation and niche marketing.

I. Introduction

The purpose of this paper is to explore the potential of sweet potatoes as a reliable money crop for small farmers in the Arkansas Delta region, an economically depressed area. A national trend has been toward large farm operations and away from smaller farms. This paper will present evidence that Arkansas sweet potatoes, a product sold largely in Dallas, may provide the best opportunity for local farmers to strategically reverse the trend and benefit from marketing a previously overlooked commodity.

Widely acknowledged throughout the world as an extremely nutritious vegetable (Low, et. al., 2007; Peet, 2001; Prakash, 1994), the sweet potato has been the subject of much recent research. Some authors have suggested that sweet potatoes might be the answer to some of the world's thorniest problems: efficient feeding of the masses and sustainable agriculture (Peet, 2001; Prakash, 1994). China is the world leader in sweet potato production, as shown in Table 1, producing over 80 percent of the world's crop in 2007. However, China appears to consume most of the sweet potatoes it grows (largely for animal feed). Figure 1 depicts Chinese trade in sweet potatoes, shown in a logarithmic scale so that both imports and exports can be portrayed on the same graph even though the two measures have vastly different scales.¹ Both imports and exports of sweet potatoes have grown in China recently, indicating that China is not so large a threat to other sweet potato producing countries as its sheer volume of production might indicate.

Fairly easy to grow in well-drained, sandy loam, it is well-adapted to the southern United States. North Carolina is the leading producer of sweet potatoes in the United States, followed by California, Mississippi, Louisiana, Alabama, and Texas, in order (NCSPC, LASPC). Figure 2 shows that the four-firm concentration ratio (by state) for sweet potatoes has been almost steadily increasing over the past thirty years, indicating that the sweet potato industry in the United States is tending to consolidate in the top four states. However, the composition of the top four producing states has changed over the

¹ To put the numbers plotted in Figure 1 in perspective, the Chinese imports in tonnes from a low of 2 in 1987 to a high of 177 in 1998. Chinese exports of sweet potatoes in tonnes varied from a low of 310 in 1966 to a peak of 96932 in 1991.

Figure 1

China Sweet Potato Trade, 1966 - 2005

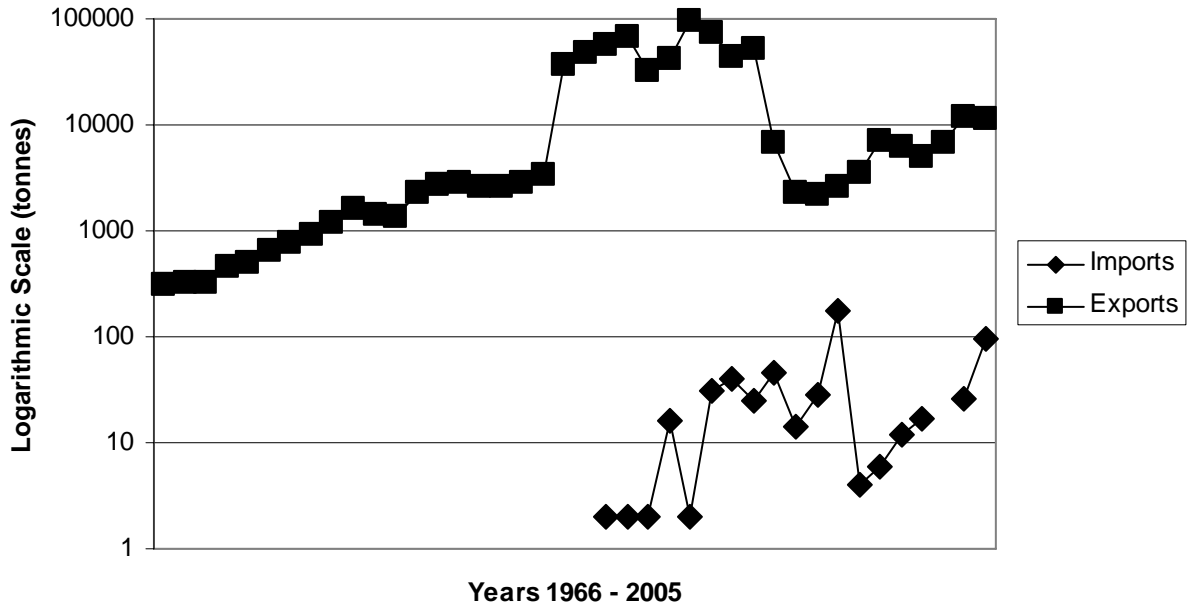
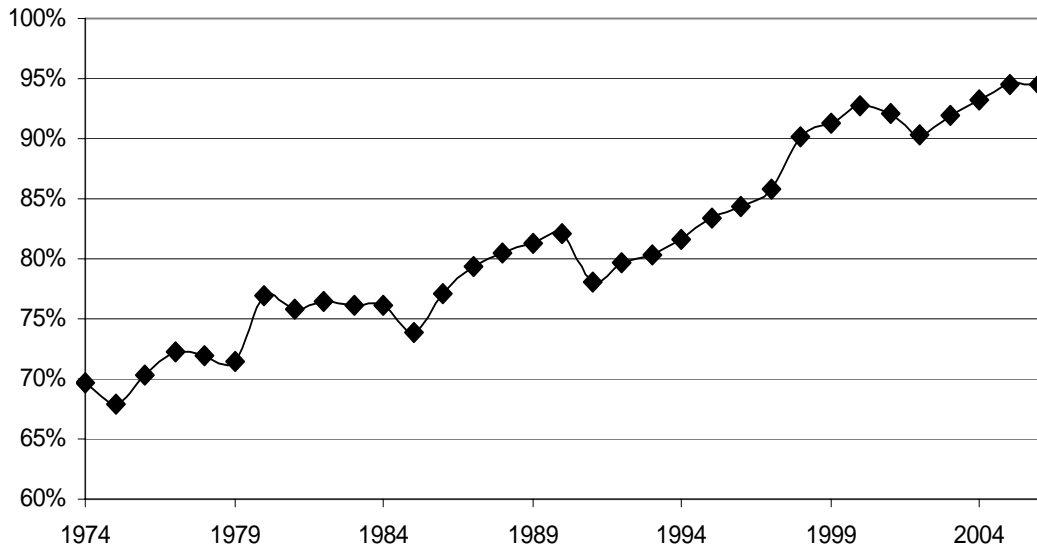


Figure 2

Four-firm (state) Concentration Ratio for Sweet Potato Production in U.S., 1974-2006



agreed to purchase No. 2 graded, cured, sweet potatoes in bulk from January through June. In addition, Glory Foods, an Ohio-based retailer of Soul Food, agreed to purchase green sweet potatoes during the months of November and December. Furthermore, ADPMA has succeeded in selling fresh sweet potatoes to Affiliated Foods for distributed in Arkansas grocery stores and is seeking certification to bid on USDA contracts for public school lunch programs (FSMIP Report, 2005). Sweet potatoes grown in Arkansas are also sold to the public in farmer's markets, most notably the Dallas market as mentioned below.

III. Data

The primary source of price information on Arkansas sweet potatoes is The Agricultural Marketing Service (AMS, 2007) of the U.S. Department of Agriculture (USDA). These data are micro, consisting of daily prices for agricultural commodities, including sweet potatoes, grown in the U.S. and sold as fresh in fourteen major agricultural markets throughout the U.S.

The USDA data indicate that no Arkansas sweet potatoes have been sold in the following markets from 1998 to 2007: Atlanta, Boston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, or Seattle. Negligible amounts have been sold in Baltimore, Chicago, and Detroit. No Louisiana sweet potatoes have been sold in Atlanta for over a year. Since most sweet potatoes are sold from trucks, it is little wonder that the high transport cost to far-flung markets may not justify the effort. In spite of this, California, further removed from the Dallas market than Arkansas or Louisiana are located from Atlanta or St. Louis, still sells substantial numbers of sweet potatoes in Dallas.

From the USDA data, it would appear that Arkansas sweet potato farmers were selling their product primarily in St. Louis from October, 1998. The market was very thin, representing only a couple of farmers selling differing varieties, grades, and sizes. The seasonal nature of Arkansas sweet potato sales resulted in fragmented price series with substantial breaks for long periods of time.

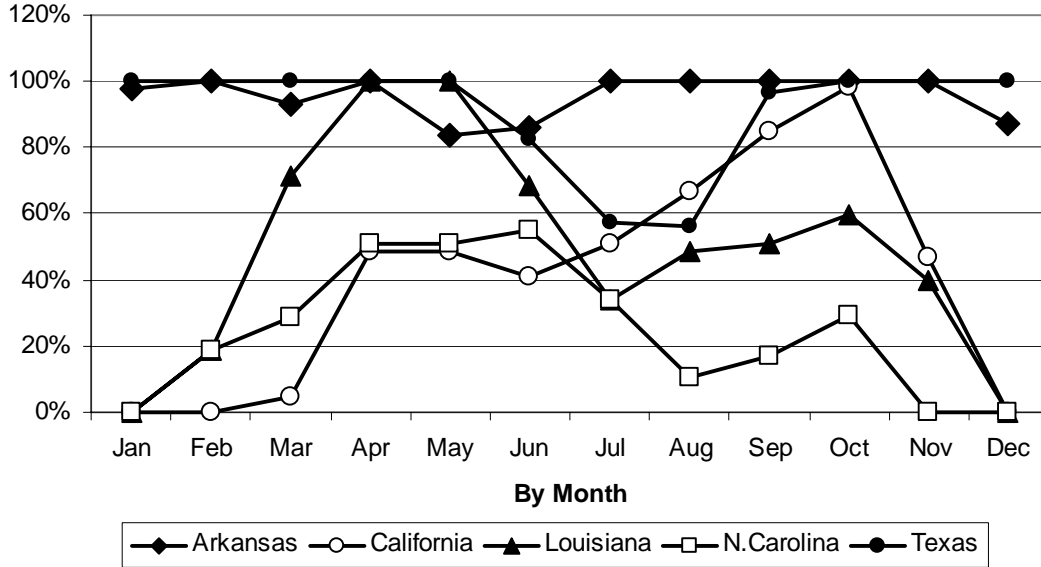
However, in late June, 2005, Arkansas sweet potato farmers began selling their product in Dallas. Sales quickly shifted from St. Louis to Dallas, with the last St. Louis sales occurring in November, 2006. The Dallas market has proven much more reliable than the St. Louis market for Arkansas sweet potatoes, with the only significant break in sales occurring for 14 days over Christmas, 2006.

Since Dallas is the dominant Arkansas sweet potato market, we analyzed price series for the Dallas market to estimate Arkansas farmers' perceptions of solidity or softness of the market for their products and to compare and contrast Arkansas farmers' potential relative to those from other states that are represented in the Dallas market. Sweet potato prices are quoted for forty pound cartons. To construct a price series, we averaged the prices for a particular product across all sellers that day. For the popular southern Beauregard variety, ungraded, Jumbo size sweet potato, we found only six breaks in Dallas sweet potato sales from all sources. Most of these breaks were for three weeks or less. The longest break was for 100 days, during the first half of 2002.

We conjecture that high transport costs are a major factor in explaining why China's sweet potato growers are not major competitors with Arkansas farmers. Although China leads the world by far in the production of sweet potatoes, as of 2001 the U.S. exported about four times as many sweet potatoes as did China (FAO Stat, 2007).

Figure 4

Percentage of Market Days that Sweet Potatoes were Sold in Dallas, 2005-2007



As a proxy for fuel costs, we used the Producer Price Index (PPI, 2007) for gasoline as reported monthly by the U.S. Bureau of Labor Statistics. The results of simple OLS regressions of monthly sweet potato prices against the gasoline PPI are shown in Table 2. Of Arkansas, California, and Texas, only California’s sweet potato prices were significantly correlated with fuel prices.⁵ Figures 5, 6, and 7 plot the prices of California, Arkansas, and Texas sweet potatoes, respectively, alongside prices estimated from the OLS model using fuel costs. Consistent with the regression results, only California’s prices closely track the prices that fuel costs explain. As might be expected, transport costs in general and fuel costs in particular remain a primary consideration for sweet potato farmers.

⁵ Since we model transportation costs, the fuel PPI is the only dependent variable we consider in Table 2. In each case (for all three states), the Durbin-Watson statistic lies below the critical lower bound, indicating positive autocorrelation (see Gujarati, 1978, pp. 226, 235-239). This is also borne out by a plot of the residuals from the regressions. Were we to use our F or t ratios for statistical inference (relying on the p values), this would be cause for concern, since the presence of autocorrelation results in inefficient, but unbiased and consistent OLS estimates. Since we are merely showing R^2 (and plotting the fit) for the three locations, however, we see no need to correct for positive autocorrelation. A possible extension of the paper is to derive a comprehensive pricing model for sweet potatoes, for which additional variables and corrections for autocorrelation would be needed, including the use of possible co-integrating factors.

Figure 5

Average Price of California Sweet Potatoes sold in Dallas and Results of Model Using Gasoline PPI, 1999-1007

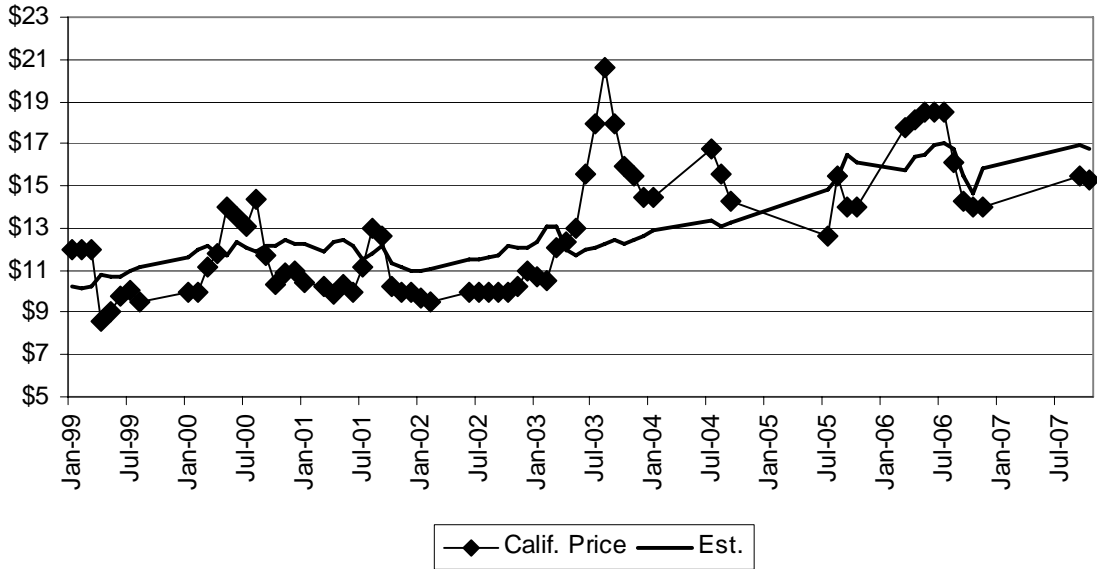
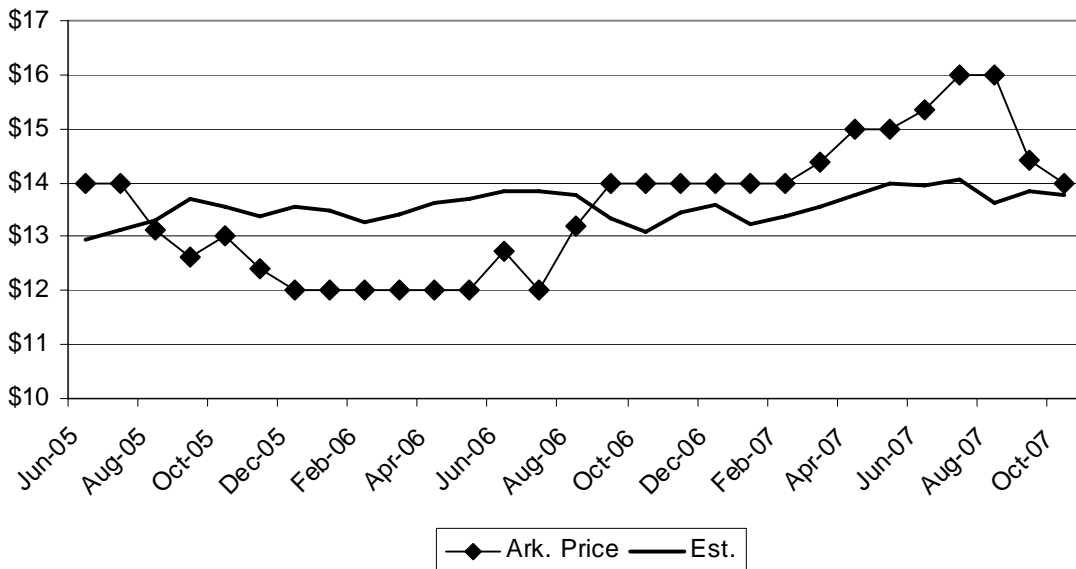


Figure 6

Average Price of Arkansas Sweet Potatoes sold in Dallas and Results of Model Using Gasoline PPI, 2005-2007



advantage in transport costs is significant. Given the recent widespread concern over food products imported from China, Arkansas' reputation as a provider of a safe product is beneficial.

Unlike farmers in other states, Arkansas sweet potato farmers seem to have concentrated on the size and grade of product that their end users most request: medium size and number one grade. Another important aspect of branding Arkansas sweet potatoes is that of culture. As pointed out in Horton and Robbins (2007), Arkansas sweet potato producers have been successful in marketing their product to Glory Foods, an Ohio-based producer of Soul Food. Alternative uses of the product, such as sweet potato French fries, have also been successfully marketed.

Much additional work remains to be done. The dynamics of the Chinese sweet potato market are difficult to discern because of limited data. In addition, different sweet potato varieties make comparisons between states, regions, and countries difficult to interpret. Also, in spite of advances in growing, transportation, and storage over the past thirty years, most sweet potato markets have remained primarily local, again making comparisons between different locations subject to error.

A fully developed time series model of sweet potato prices, while beyond the scope of this paper, may be developed using the USDA databases referred to in the reference section. As mentioned in a footnote above, such a model should investigate possible co-integrating factors since commodity prices tend to be non-stationary. In addition, a production model of sweet potatoes, again using input data available from the USDA, is needed for Arkansas and surrounding states. Another possible extension of the current paper would be a case comparison of the Arkansas sweet potato industry with that of its less successful neighbor in the industry, Mississippi.

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