MIDWESTERN BUSINESS AND ECONOMIC REVIEW

In This Issue ....

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MIDWESTERN BUSINESS AND ECONOMIC REVIEW

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ABSTRACTS

- ## Regional Economic Growth: Do Neighboring Nations Matter?

The cross-national growth literature has generally overlooked the spatial relationship between a nation's economic wellbeing on that of its surrounding neighbors. This paper attempts to overcome this deficiency by using spatially weighted measures of regional supply and regional demand in the cross-nation growth context. A sample is used of 24 OECD nations with yearly observations from 1961 to 1995. The results indicate that all else constant, growth in regional GDP, regional GDP per capita, regional volume of imports, and regional volume of exports all have positive and significant effects on a nation's annual GDP growth.

- ## A Long-Run Time Series Analysis of US and UK Unemployment Rates

This paper analyses the long-run behavior of US and UK unemployment rates by testing for unit roots and multiple structural changes in over 100 years of annual data. Our rejection of the unit root for both series is consistent with the natural rate of unemployment theory in which the actual unemployment rate fluctuates around, but eventually reverts to the natural rate. We also find structural breaks in both unemployment rates which are consistent with the more contemporary versions of natural rate theory in which the natural rate of unemployment is not fixed, but may shift over time.

- ## Building a Space Management System

Public entities such as federal research centers, public universities, municipalities, and other government agencies frequently have multiple facilities and logistics to take into account for expenditures and protective measures. For sponsored federal research, public organizations have the potential of capturing more accurate costs estimates for overhead expenses. Public organizations also need to account for the new threats of terrorism. In most public organizations, hazardous materials (HAZMAT) are present in facilities in the form of cleaning supplies, building maintenance or research materials that could be potential used in destructive or deadly devices. For public organizations, HAZMAT issues present new challenges combined with a new awareness of a need for increased security concerns. In this aspect space management and logistical tracking is a vital administrative component at organizations in the public sector. A variety of software products have been developed by multiple vendors specifically to handle data on building space and to generate reports to administration and state and federal agencies. However, when software becomes a burden to use rather than an asset or if the software is incompatible with the institution's current systems such off the shelf products with limited flexibility can quickly become an expensive liability

- ## Leadership — Does Style Matter in a Non-Profit Agency?

There are numerous widely studied and applied styles of leadership in managing non-profit organizations, (Lewis & Plas, (2001); Northouse, 2004; Burke, 2002; Terry, 2003). Such as the Situational Approach, Leader-Member Exchange Approach, Path-Goal Approach, Transformational Approach and Team Leadership Approach, etc. All of these approaches contain some related similar elements such as clear, concise and frequent communication between the leader and subordinates, clear mission goals, competencies, team building and leading, etc. Although most might work well in a non-profit agency, (Lewis and Plas, 2001) they are good examples of, "typical, traditional management models." For this non-profit agency the search is for the best fit to its unique mission – no paid administrative staff, volunteer staff only. This paper will explore the issue of the importance of management style in non profit agencies.

- ## The Role of Liberty in the Schumpeterian Paradigm

The work of Joseph Schumpeter stands as a bit of an anomaly in the field of economics. He was apparently a defender of capitalism, or at least one who believed that it had a great potential to generate wealth. However, he also noticed very real inefficiencies in capitalism and did seem to believe that, while perhaps not ultimately desirable, socialism was in fact workable. One way in which Schumpeter's work stands out from the work of other defenders of capitalism is his rejection of liberty as the cornerstone of his political philosophy. Once this choice had been made Schumpeter left himself little choice but to ultimately advocate a hazy form of corporatism. Being concerned by both the potentially choking bureaucracy socialism could produce and by the inefficiencies of capitalism, Schumpeter left himself no option other than corporatism.

- ## What Has Affected the Unemployment Rates in the USA: Preliminary Analysis of the Last 12 Years – Elections and 9/11

According to the Political Business Cycle Theory, elections have a way of influencing economic indicators in a political economy. This paper tries to analyze if the elections of 1992, 1996 and 2000 have affected the rates of unemployment in the USA with the help of the AD-AS model. It also tests if September 11 had a tangible effect on the unemployment rates. The methodology used is the Box-Jenkins Intervention and Transfer Modeling using RATS.

Regional Economic Growth: Do Neighboring Nations Matter? *

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Introduction

The geographer W. Tobler is noted for stating that the first law of geography is: "everything is related to everything else, but near things, are more related than distant things" (Tobler 1970). Unfortunately, the cross-national economic growth literature has tended to ignore this law. Instead of spatial proximity, much of the literature has focused on the impact of political and institutional variables on economic growth, although the results have been widely erratic. For example, Bergson (1987), Pourgerami (1988), Scully (1988), Torstensson (1994), Vanssay and Spindler (1994) and Abrams and Lewis (1995) all conclude that democracy and (or) political-economic freedoms are positive and significant determinants of economic growth. By contrast, Sloan and Tedin (1987), Barro (1991), Levine and Renelt (1992), Haan and Siermann (1995) and Leblang (1996) all conclude that political-economic freedoms and (or) democracy are not significant determinants. [1]

Also of primary concern has been the impact of government consumption on economic growth. Grier and Tullock (1989), Barro (1991) and Barro and Sala-I-Martin (1995), for example, have found empirical support for the argument that large governments can create perverse incentives for rent-seeking, cause substantial distortion effects from taxation and crowd out private investment. Other topics of interest include the impact of political instability on economic growth (see Fosu 1992; Cukierman, Edwards and Tabellini 1992; Alesina and Perotti 1993), and the impact of culture on economic growth (Granato et. al. 1996; Jackman and Miller 1996; Swank 1996; Lian and Oneal 1997).

What is generally not discussed is the influence of spatial location on a nation's economic growth. This is somewhat surprising since spatial proximity is commonly considered in urban and regional studies. Glaeser, Kallal, Scheinkman, and Shleifer (1992), for example, provide substantial evidence on the benefits of knowledge spillovers across 170 standard metropolitan statistical areas. Research on the spatial relationships in urban housing markets, moreover, has driven a rapid expansion of articles on spatial econometrics (see Anselin 1988; Anselin and Hudak 1992; Dubin 1998; Anselin and Bera 1998; Baltagi and Li 1999). General exceptions to this include Aden and Chua (1997), who address the issue of regional instability on a nation's economic growth, and Moreno and Trehan (1997), who address the issue of technology and gross income spillovers using a variety of distance proximity techniques.

This paper differs from its predecessors in the cross-national economic growth literature by attempting to draw upon themes and techniques more commonly seen in urban and regional studies. We evaluate the impact of spatial location on a nation's economic growth rate by constructing several general indicators of regional demand and regional supply. These measures are then used in a panel of 24 OECD nations covering the years 1961-1995.

The following section describes the data that is utilized and defines the construction of the regional variables. Section 3 presents the results and analysis of the effect of regional demand (subsection 3.1) and regional supply (subsection 3.2) on a nation's economic growth, after controlling for other relevant factors. Section 4 summarizes the findings.

Data

Annual data is collected on 24 OECD nations covering the years 1961 to 1995. [2] The majority of this data is taken from OECD Historical Statistics (1997). It is important to note that although this data set is not extensive in terms of the number of nations, it does have the important advantages of completeness and overall quality, which is generally lacking in many cross-national growth articles. Data on secondary school enrollment is taken from UNESCO (1997), and data on direct-line distances between nations is taken from Fitzpatrick and Modlin (1986).

This data is then used to test the hypothesis is that economic growth is a function of the growth of capital investment, the growth of human capital investment, the growth in the volume of trade (seen as both imports to other nations and exports from other nations), the change in inflation, the change in government's involvement, as well as the degree of interaction with, and wellbeing of, surrounding nations. Spatial proximity is determined by the direct-line distances between two nations, such that the regional growth in variable x for the ith nation (x_i^R) is determined by the

1

sum of each nation's growth in x divided by the geographic distance between that nation and the ith nation:

$$(2.1). \quad x_i^R = \sum_{j=1}^{N} \frac{x_j}{d_{ij}}$$

Geographical distances (d_{ij}) are obtained by using the "great circle" formula:

$$(2.2), \quad \cos(d_{ij}) = (\sin LAT_i \cdot \sin LAT_j) + \cos LAT_i \cdot \cos LAT_j \cdot \cos(LNG_i - LNG_j)$$

where LAT_i is the latitude of the capital city of the ith nation, and LNG_i is the longitude of the capital city of the ith nation.[3] As a result, every nation has a unique regional effect on every other nation, and the total regional effect for a given variable will be unique for every nation.

Measuring spatial proximity with a direct line distance from capital city to capital city does create some epistemological error. However, alternative measures of spatial proximity, such as a dummy variable of first order contiguous neighbors, also create epistemological error *and* substantially decrease the variability of the measure. Thus in terms of scaling, the direct line distance measure is preferred.

Using equation *(2.1), six different avenues can be defined by which the* spatial location of a nation may impact other nations. Three of these measures, regional population, regional gross domestic product per capita, and regional imports, are considered general indicators of regional demand. It is expected that the greater the growth in regional demand, all else equal, the greater the growth in GDP of nations in that region. Similarly, two additional measures, regional capital investment and regional exports, are considered indicators of regional supply. A sixth and final measure, regional GDP, is considered a more general measure of regional prosperity, although it can also be seen as a measure of regional demand, analogous to regional GDP per capita.

Analysis

The results of the regression analyses are presented in Tables 1, 2, and 3. The estimated model follows the form:

$$(3.1), \quad Y_{i,t} = i\alpha_i + x_{i,t}\beta + x_{i,t}^R \beta^R + v_{i,t}$$

where the cross-section identifier, $i = 1....,N$ and the time-series identifier, $t = 1,...,T$

The dependent variable $Y_{i,t}$ is the percent growth in GDP, a_i is a fixed-effects parameter estimate for each cross section i, b is a vector of parameter estimates for the control variables (capital investment, secondary education, population size, imports, exports, CPI, and size of government), and b^R is the parameter estimate for the spatially weighted variable $x_{i,t}^R$

as defined in equation *(2.1)*.[4]

Variables are calculated as the year to year percent growth.

Estimation by OLS is rejected because of evidence, albeit mild, of first-order autocorrelation.[5] Therefore, the disturbance vector is AR(1):

$$(3.2), \quad v_{i,t} = \rho\, v_{i,t-1} + \varepsilon_{i,t}$$

where $\varepsilon_{i,t}$ is $iid(0, s^2)$.[6] For comparison, the least square dummy variable (LSDV) parameter estimates are provided in models *(2.iii)* and *(2.vi)* in Table 2.

The focus of Table 1 is on the impact of regional gross domestic product (REG GDP) on gross domestic product (GDP). Models *(1.i), (1.ii),* and *(1.iii)* use government employment as a percent of total employment as the measure of government, whereas models *(1.iv), (1.v),* and *(1.vi)* use government outlays. Model *(1.i)* includes all control variables, while model *(1.ii)* drops the insignificant control variable, SECONDARY. Model *(1.iii)* is a simple re-estimation of model *(1.ii)* using the method of ordinary least squares. Likewise, model *(1.iv)* includes all control variables, plus government outlays and regional GDP. Model *(1.v)* is the parsimonious version of *(1.iv)*, and model *(1.vi)* re-estimates *(1.v)* using OLS.

Table 1 - Regional Effects on Percent Change in GDP

	(1.i) AR(1)DV Estimates	(1.ii) AR(1)DV Estimates	(1.iii) LSDV Estimates	(1.iv) AR(1)DV Estimates	(1.v) AR(1)DV Estimates	(1.vi) LSDV Estimates
Intercept	0.464	0.492	0.464	1.572**	1.627**	1.607**
	(1.11)	(1.19)	(1.19)	(3.64)	(3.82)	(3.94)
CAPITAL	0.180**	0.181**	0.185**	0.175**	0.175**	0.177**
	(18.07)	(18.28)	(18.83)	(17.70)	(17.85)	(18.25)
SECONDARY	0.000			0.000		
	(1.22)			(0.63)		
POPULATION	0.302**	0.283**	0.298**	0.295**	0.285**	0.297**
	(4.80)	(4.65)	(5.24)	(4.85)	(4.88)	(5.34)
EXPORTS	0.109**	0.108**	0.112**	0.106**	0.106**	0.109**
	(10.38)	(10.38)	(10.84)	(10.35)	(10.36)	(10.69)
IMPORTS	0.064**	0.064**	0.066**	0.066**	0.067**	0.068**
	(6.65)	(6.71)	(6.83)	(7.01)	(7.10)	(7.22)
CPI	-0.020**	-0.019**	-0.016**	-0.019**	-0.019**	-0.017**
	(-2.73)	(-2.64)	(-2.42)	(-2.69)	(-2.68)	(-2.54)
GOV EMPLOY	-0.038*	-0.038*	-0.036**			
	(-2.06)	(-2.04)	(-2.08)			
GOV OUTLAY				-0.043**	-0.044**	-0.043**
				(-5.73)	(-5.93)	(-6.10)
REG GDP	8.694**	8.947**	8.201**	5.162*	5.192*	4.557*
	(3.81)	(3.93)	(3.72)	(2.26)	(2.28)	(2.06)
p	-0.076*	-0.080*		-0.055	-0.059	
	(-2.08)	(-2.22)		(-1.51)	(-1.62)	
DW	2.006	2.007	1.861	2.002	2.004	1.898
R^2	0.695	0.694	0.692	0.706	0.705	0.704

Note: Fixed-effects parameter estimates are not included in table. T-ratios are in parentheses. The dependent variable is the percent change in gross domestic product. ** Indicates significance at .01 level, * indiates significance at .05 level.

Table 2 — Regional Demand Effects

	(2.i) AR(1)DV Estimates	(2.ii) AR(1)DV Estimates	(2.iii) AR(1)DV Estimates	(2.iv) AR(1)DV Estimates	(2.v) AR(1)DV Estimates	(2.vi) AR(1)DV Estimates
Intercept	0.640	0.686	0.899*	1.679**	2.198**	1.841**
	(1.60)	(1.55)	(2.35)	(4.14)	(8.62)	(4.79)
CAPITAL	0.181**	0.185**	0.183**	0.174**	0.177**	0.175**
	(18.32)	(18.72)	(18.56)	(17.84)	(18.11)	(17.96)
POPULATION	0.287**	0.284**	0.291**	0.287**	0.299**	0.289**
	(4.73)	(4.69)	(4.79)	(4.91)	(5.11)	(4.97)
EXPORTS	0.108**	0.121**	0.110**	0.105**	0.113**	0.105**
	(10.37)	(12.21)	(10.46)	(10.25)	(11.62)	(10.18)
IMPORTS	0.064**	0.071**	0.064**	0.066**	0.071**	0.066**
	(6.68)	(7.50)	(6.58)	(7.04)	(7.66)	(6.92)
CPI	-0.019**	-0.019**	-0.019**	-0.019**	-0.019**	-0.018**
	(-2.68)	(-2.61)	(-2.63)	(-2.70)	(-2.70)	(-2.66)
GOV EMPLOY	-0.042*	-0.044*	-0.049**			
	(-2.28)	(-2.34)	(-2.72)			
GOV OUTLAY				-0.045**	-0.051**	-0.047**
				(-6.18)	(-6.46)	(-6.63)
REG GDPPC	9.187**			5.950**		
	(3.83)			(2.51)		
REG POP		30.852*			-3.440	
		(2.22)			(0.24)	
REG IMPORT			2.790**			1.972*
			(3.19)			(2.30)
p	-0.080*	-0.061	-0.078*	-0.059	-0.045	-0.057
	(-2.21)	(-1.69)	(-2.15)	(-1.63)	(-1.26)	(-1.59)
DW	2.007	2.005	2.007	2.004	2.002	2.003
R^2	0.694	0.690	0.692	0.706	0.703	0.705

Table 3 — Regional Supply Effects

	(3.i) AR(1)DV Estimates	(3.ii) AR(1)DV Estimates	(3.iii) AR(1)DV Estimates	(3.iv) AR(1)DV Estimates
Intercept	0.769**	1.122**	1.710**	2.066**
	(1.96)	(3.01)	(4.36)	(5.52)
CAPITAL	0.186**	0.182**	0.177**	0.176**
	(18.90)	(18.11)	(18.19)	(17.75)
POPULATION	0.289**	0.297**	0.287**	0.296**
	(4.77)	(4.90)	(4.92)	(5.10)
EXPORTS	0.109**	0.118**	0.103**	0.112**
	(10.28)	(11.69)	(9.89)	(11.29)
IMPORTS	0.063**	0.070**	0.065**	0.071**
	(6.45)	(7.33)	(6.74)	(7.58)
CPI	-0.019**	-0.019**	-0.019**	-0.018**
	(-2.68)	(-2.60)	(-2.69)	(-2.66)
GOV EMPLOY	-0.050**	-0.053**		
	(-2.79)	(-2.92)		
GOV OUTLAY			-0.047**	-0.049**
			(-6.74)	(-6.88)
REG EXPORT	3.737**		3.016**	
	(3.43)		(2.83)	
REG CAPITAL		1.600		0.516
		(1.82)		(0.60)
p	-0.076*	-0.071*	-0.057	-0.048
	(-2.09)	(-1.95)	(-1.59)	(-1.33)
DW	2.006	2.007	2.003	2.002
R^2	0.693	0.689	0.706	0.703

This evidence indicates that capital investment (CAPITAL), population size (POPULATION), volume of exports (EXPORT), and volume of imports (IMPORT) are all positive and significant determinants, while inflation (CPI), government employment (GOV EMPLOY), and government expenditure outlays (GOV OUTLAY) are all negative and significant determinants of a nation's GDP. These relationships are further replicated in Tables 2 and 3. It is noteworthy that secondary school enrollment (SECONDARY) is found to be insignificantly different from zero in all cases.[7] If the independent variable POPULATION is omitted and the dependent variable GDP per capita is used instead of GDP, the results are relatively identical.

Most importantly, Table 1 finds that regional GDP is a positive and significant determinant of a nation's GDP in all models. These results indicate that a one percent change in regional GDP will result in a 0.135% (model *1.ii) to a* 0.078% (model *1.iv) increase in* GDP.

Dealing with the problems presented by spatial relationships is a relatively new topic in econometrics. Anselin (1988) demonstrated that if spatial correlation exists among observations and is ignored, OLS will give unbiased but inefficient parameter estimates (see also Anselin and Bera 1998; Baltagi and Li 1999). This problem is generally presented in the context of housing prices where common location-based factors, such as crime or school quality, will affect the prices of houses in a neighborhood similarly. A general test of spatial correlation is Moran's I statistic:

$$I = \frac{N(e'We)}{S(e'e)}$$

where N is the number of observations, e is a vector of regression residuals, W is a $N' N$ distance weight matrix, and S is a standardization factor equal to the sum of all the elements of the distance weight matrix (see Anselin 1988; Anselin and Hudak 1992; Dubin 1998). Several specialized tests have been developed in recent years to detect either a spatial autoregressive process in the error term (spatial error),,

$$v_{i,t} = \lambda W v_{i,t} + \varepsilon_{i,t}$$

or a spatial autoregressive process of the dependent variable (spatial lag),.

$$Y_{i,t} = \rho W Y_{i,t} + x_{i,t}\beta + \varepsilon_{i,t}$$

Anselin, Bera, Florax, and Yoon (1996) and Anselin and Moreno (2001), show that Lagrange multiplier tests for spatial error (LM$_{err}$) and spatial lag (LM$_{lag}$) perform remarkably well in terms

of power and reliably.[8]

Estimation of model (*1.ii) from* Table 1 *without* the regional GDP variable, generates an insignificant LM$_{err}$ *(p-value 0.999) and* LM$_{lag}$ *(p-value 0.871), but* a significant Moran's *I (p-value 0.000).* However, when model (*1.ii) is* estimated *with* the regional GDP variable, all three measures are insignificant (*p-value 0.999, 0.882, and 0.118 respectively), indicating* that the inclusion of regional GDP sufficiently accounts for spatial autocorrelation. Likewise, estimation of model (*1.v) without* the regional GDP variable, generates an insignificant LM$_{err}$ *(p-value 0.999) and* LM$_{lag}$ *(p-value 0.830), but* a significant Moran's *I (p-value 0.000). However,* when model (*1.v) is estimated with* the regional GDP variable, all three measures become insignificant (*p-value 0.999, 0.564, and 0.115* respectively). Consequently, the inclusion of regional GDP accounts for spatial autocorrelation, and provides an estimate of the degree of to which the spatial proximity of wealth impacts a nation's GDP.

Regional Demand Measures

Table 2 presents the results for the three measures of regional demand: regional GDP per capita, regional population, and regional imports. In all cases, the dependent variable is the growth in GDP, and the set of control variables is a parsimonious set identical to models (*1.ii) and (1.v). Using either measurement of government, models (2.i) and (2.iv)* indicate that the growth in regional GDP per capita is a positive and highly significant determinant of a nation's GDP. Model (*2.i)* indicates that a one percent increase in regional GDP per capita will lead to a 0.112% increase in GDP, while model (*2.iv) indicates that a* one percent increase in regional GDP per capita will cause a 0.073% increase in a nation's GDP.

Models (*2.ii) and (2.v) present evidence on the impact of regional population.* The results here are not robust to the measure of government used. In model (*2.v) when government outlays are used,* the growth in regional population is insignificantly different from zero, but in model (*2.ii) when government* employment is used, regional population is positive and statistically significant. Given this lack of robustness, this evidence seems supportive of the idea that an increase in the number of buyers alone is not enough to stimulate growth, but that an increase in the income of those buyers (regional GDP per capita) does stimulate growth.

The evidence on the regional volume of imports is presented in models (*2.iii) and (2.vi). In both cases,* regional imports is a positive and significant determinant of a nation's GDP. Hence, if regional nations increase their volume of imported goods by one percent, all else equal, a nation in that region can expect to gain between a 0.074% (model *2.iii) and a* 0.053% *(model 2.vi)* increase in GDP.

Supply Measures

Table 3 presents the evidence on the two measures of regional supply: regional volume of exports and regional capital investment. The dependent variable in all cases is again GDP growth, and the set of control variables is limited to only those which are statistically significant. Models *(3.i)* and *(3.iii)* show that regional exports are a significant and positive determinant of a nation's GDP, across both measures of government. Specifically, model *(3.i) shows* that a one percent increase in the volume of exports by regional nations will cause a 0.103% increase in the GDP of a nation, while model *(3.iii)* shows that a similar one percent increase will lead to a 0.083% increase in GDP.

Models *(3.ii) and (3.iv) present evidence on the impact of regional capital* investment on a nation's GDP. In both models, regional capital is to be positive but insignificant at the 0.05 level. Indicating that a nation's investment in capital alone does not significantly impact the GDP of surrounding neighbors, although increasing the volume of exports does.

Conclusion

The paper has considered the spatial relationship between a nation and its surrounding neighbors. While spatial proximity has often been considered in cross-city and city-industry economic growth literatures, extraordinarily few attempts have been conducted in the cross-national growth literature. The results here show that this omission has been inappropriate. Using a sample of 24 OECD nations with annual observations from 1961 to 1995, we find that the regional demand and regional supply from a nation's neighbors are important and significant determinants of that nation's rate of economic growth.

More specifically, a nation's GDP will increase by 0.078% to 0.135% for every one percent increase in regional GDP. Similarly, a one percent increase in regional GDP per capita will lead to a 0.073% to 0.112% increase in GDP; while a one percent increase in the regional volume of imports will result in a 0.053% to 0.074% increase in GDP. In terms of regional supply, a nation's GDP will increase by 0.083% to 0.103% for every one percent increase in the regional volume of exports.

Endnotes

[1] Frank (1998) argues that these contrasting results are in part due to large variations in the set of control variables used, with some including only capital investment and population size as control variables (see for example, Bergson 1987; Scully 1988), while others include capital investment, population size, secondary education, volume of exports, volume of imports, and inflation (see for example, Barro 1991; Levine and Renelt 1992).

[2] Nations included in the sample: United States, Japan, Germany, France, Italy, UK, Canada, Australia, Austria, Belgium, Denmark, Finland, Greece, Iceland, Ireland, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, and Switzerland. OECD nations omitted: Czech Republic, Korea, Hungary, Poland, and Turkey.

[3] The capital city for Germany is Bonn for all years.

[4] A fixed effects model is justified because the Breusch and Pagan's (1980) LM test for fixed effects and random effects is significant, while the Hausman (1978) test for random effects is insignificant.

[5] Errors from the model were also found to be stationary.

[6] Evidence for possible autocorrelation is taken from the Durbin-Watson test (DW), which is provided in each table for each estimation.

[7] Several alternative measures of education and human capital were also tested, and although not reported here, were found similarly to be insignificantly different from zero. As de la Fuente and Doménech argue, this is a common problem in nearly all cross-national growth models, and is likely a consequence of poor data quality with respect to human capital (de la Fuente and Doménech 2001).

[8] Specifically, the spatial error test is calculated as

$$LM_{err} = \frac{\left(e'We/\sigma^2\right)^2}{tr\left(W'W + W^2\right)},$$

where *tr* is the trace operator, while the spatial dependence test is calculated as

$$LM_{lag} = \frac{\left(e'WY/\sigma^2\right)^2}{\left(Wx\beta\right)' MWx\beta/\sigma^2 + tr\left(W'W + W^2\right)}$$

where

$$M = I - x(x'x)^{-1} x'.$$

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A Long-Run Time Series Analysis of US and UK Unemployment Rates

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Introduction

The natural rate of unemployment theory asserts that the actual unemployment rate fluctuates around some normal or natural rate of unemployment. This theory has also been expanded to allow the natural rate to change over time. Phelps (1996) describes the natural rate of unemployment as "the moving target that the equilibrium path constantly pursues." This implies that while most unemployment fluctuations are temporary, some are permanent shifts of the natural rate.

Despite the theoretical and empirical evidence of a shifting natural rate, most time series studies of unemployment rates have relied on unit root tests to describe their behavior. A unit root implies that there is no reversion to a natural rate of unemployment since all fluctuations are permanent. This is the most extreme form of hysteresis, which in general means "a very high dependence of current unemployment on past unemployment" (Blanchard & Summers, 1996). A rejection of the unit root supports reversion to a natural rate, however the slow reversion that is generally found is considered a form of hysteresis as well. Blanchard and Summers (1986) define hysteresis as a "case where the degree of dependence is very high, where the sum of coefficients is close but not necessarily equal to one." However, standard unit root tests do not allow the rate to which reversion occurs (the natural rate) to shift and are therefore inadequate to describe the true behavior pattern of unemployment rates.

This paper takes a data-driven rather than theory driven econometric approach to describing the behavior of US and UK unemployment rates. We utilize a procedure that allows us to separate the permanent shifts from the temporary fluctuations. Using this procedure developed by Bai and Perron (1998), we find multiple structural shifts in the means of both the US and UK unemployment rates. [1] Due to the long run nature of our data, we interpret these shifts as movements of the natural rate of unemployment.

Stationarity

The Bai-Perron procedure is designed to detect structural changes in a non-trending, regime-wise stationary time series; therefore, stationarity of the data must first be established. To do so, we run ADF tests on the two unemployment rate series using the following regression:

$$1) \qquad \Delta u_t = \mu + \alpha u_{t-1} + \Sigma_{i=1}^{k} c_i \Delta u_{t-i} + \varepsilon_t$$

where u is the unemployment rate. The lag length k is chosen by a procedure suggested by Campbell and Perron (1991) and Ng and Perron (1995). First an upper bound $kmax$ is selected for k. If the last lagged difference is significant, k is set equal to $kmax$. If not, k is reduced by one and the process is repeated until the last lagged difference is significant. Following Perron (1989), we set $kmax = 8$ and use a critical value of 1.645 from the asymptotic normal distribution to assess significance.

The results of the ADF tests are reported in table 1. For both the US and UK unemployment rate series, the unit root can be rejected at the 1 percent level. This rejection of the unit root rules out strict hysteresis, however the results may still be consistent with a looser definition. The data show mean reversion to what we will call a natural rate of unemployment.

Table 1.— Augmented Dickey-Fuller Tests

unemployment rte	data span	k	a	t stat on *a*
United Kingdom	1855-2000	1	-0.17	-3.96
United States	1889-2001	6	-0.24	-3.60

critical values

10%	5%	1%
-2.57	-2.88	-3.46

Although we do not establish this mean rate as that which holds inflation stable, we consider the data set long enough that if there is mean reversion, it must be to the long run equilibrium or natural rate of unemployment. However this mean reversion does not preclude the existence of permanent shocks. Recent evidence has shown that in very long time series, a unit root rejection is possible even in the presence of a few permanent shocks. It is for this reason that we test separately for structural changes in the data.

Structural Change

Structural change research has typically involved testing the null hypothesis that a time series contains no structural change against an alternative hypothesis that the series contains a single break at an unknown date. There are two problems with this type of test. First, there is no theoretical justification for the assumption that a time series would contain at most one break. Second, there is no reason to believe that the number of breaks will be known if the dates of the breaks are not.

Bai and Perron (1998) have developed a test, in which multiple break dates can be estimated either simultaneously or sequentially. They show that, for stationary non-trending data, both methods provide consistent estimates of the true break dates. [2] We use a GAUSS program provided by Perron, which runs several versions of the test under different null and alternative hypotheses. Each test is based on an F statistic testing the equality of the means of subsamples of data using the following model with m breaks at dates $T_1, T_2, \ldots, T_m$.

(3)

$$u_t = \delta_1 + \varepsilon_t \qquad t = 1, \ldots T_1$$

$$u_t = \delta_2 + \varepsilon_t \qquad t = T_1 + 1, \ldots T_2$$

$$\downarrow$$

$$u_t = \delta_{m+1} + \varepsilon_t \qquad t = T_m + 1, \ldots T$$

Table 2.— Bai - Perron Tests

unemployment	data span	UDmax	WDma	SupF (2/1)	SupF (3/2)	SupF (4/3)
United Kingdom	1855 - 2000	81.56	137.64	12.03	16.11	1.88
United States	1890 - 2001	19.74	36.58	14.23	13.69	13.69

unemployment rate	data span	coefficients d_1	T1 d_2	T2 d_3	T3 d_4	T4 d_1
United Kingdom	1855 - 2000	4.14	1918 9.11	1939 1.83	1977 7.99	
United States	1890 - 2001	8.14	1905 4.94	1926 13.89	1942 4.41	1973 6.78

unemployment rate	break dates	95% CI	90% CI
United Kingdom	1918	1903 - 1923	1907 - 1921
	1939	1937 - 1946	1937 - 1944
	1977	1975 - 1979	1975 - 1979
United States	1905	1899 - 1934	1901 - 1926
	1926	1921 - 1927	1922 - 1927
	1942	1940 - 1946	1940 - 1945
	1973	1961 - 1984	1964 - 1981

Critical Values

test	10%	5%	2.50%	1%
UDmax	7.46	8.78	10.39	12.37
WDmax	8.2	9.91	11.67	13.83
SupF(2/1)	8.51	10.13	11.86	13.89
SupF(3/2)	9.41	11.14	12.66	14.8
SupF(4/3)	10.04	11.83	13.4	15.28

The test is run at each possible break date (with 15% trimming) so that the maximum F (Sup-F) statistic can be determined. To identify multiple mean changes, the procedure is performed sequentially (further subdividing the sample until all sub-samples are free from breaks), or simultaneously where the null of no breaks is tested against the alternative of a specific number of breaks or an unknown number of breaks. According to Bai and Perron (1998), "the sequential procedure works best in selecting the number of breaks," and will therefore be our primary test of interest. However, in the case of multiple structural breaks, the sequential procedure lacks power in detecting the initial break and so in those instances, we will rely on other results to make our conclusions.

The results of the Bai-Perron test on the unemployment rates are presented in table 2. The UD max and WD max tests both test the null hypothesis of no breaks against an unknown number of breaks. The first is an un-weighted version, and the second is a weighted version. [3] In both of these tests, the null hypothesis is rejected at the 1% level for both the UK and US unemployment rate series. This indicates the presence of at least one break in each series. To determine the exact number, we utilize the results

from the sequential procedure, denoted SupF(i+1 / i). Based on these results, the UK unemployment series contains three breaks. It has a positive shift in 1918, a negative shift in 1939, and a positive shift in 1977. The US unemployment series is found to have four shifts: a negative one in 1905, a positive one in 1926, a negative one in 1942, and a positive one in 1973.

Our findings are illustrated in figure 1. Each unemployment rate is plotted along with its mean. The distinct mean shifts in the data can clearly be seen, as the actual rate fluctuates around the shifting natural rate in each series.

Conclusion

The natural rate of unemployment is that rate to which the actual rate converges in the long run. In a very long time series of data, we interpret the mean to be the long run equilibrium and therefore the natural rate of unemployment. If this mean is constant, and variations from it are very persistent, this could be interpreted as hysteresis. However, this is not what we find in our data for the

figure 1.
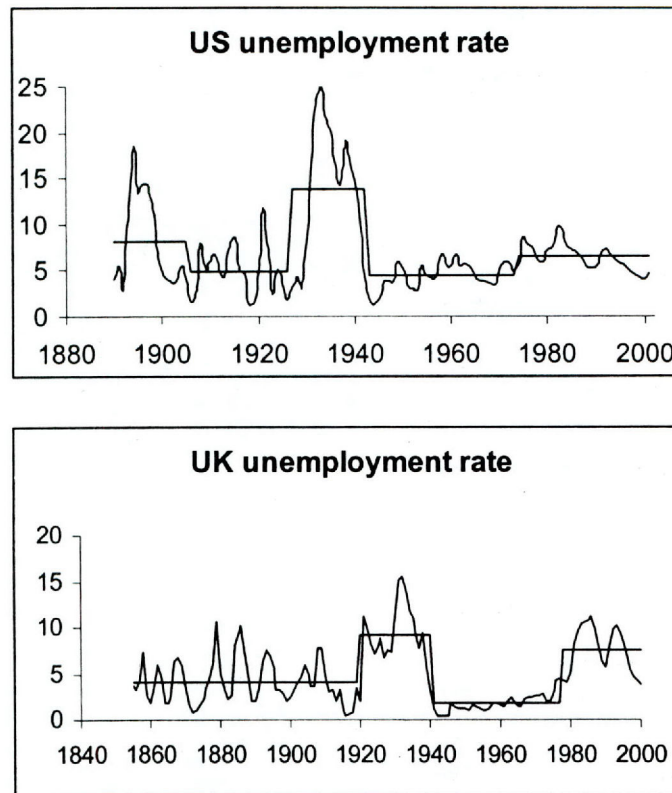
US or the UK. Using a test for multiple structural changes, we find numerous shifts in the means of both series. This implies numerous shifts in the natural rate of unemployment.

This result supports the recent work of Staiger, Stock, and Watson (1997), Gordon (1997), and Stiglitz (1997) who all interpret the recent behavior of the US unemployment rate as shifts of the natural rate. Our results are not consistent with much of the research on European unemployment. Blanchard and Summers (1996) find a high degree of persistence in UK data, which they label as hysteresis. We assert that the perceived high persistence is actually a few permanent shifts of the natural rate that can appear to be very persistent temporary deviations from the natural rate.

Endnotes

1. The data includes annual US unemployment rates from 1890 to 2001 and annual UK unemployment rates from 1855 to 2000. A complete discussion of the data can be found in Bianchi and Zoega (1996). Their data set ended in 1994 and has therefore been updated using International Financial Statistics data through 2000.

2. Vogelsang (1997) develops similar tests for a single break, which allow for trending and non-stationary data.

3. For a detailed explanation of these double maximum tests, see Bai and Perron (1998).

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Building a Space Management System

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Introduction

In the post 9/11 Era, public organizations have two focal points that now need to be addressed due to the downturn in the nation's economy, and the new threat from terrorism. Public entities such as federal research centers, public universities, municipalities, and other government agencies frequently have multiple facilities and logistics to take into account for expenditures and protective measures. In the case of expenditures, utility costs and loss of inventory are two areas that public organizations have the potential to address in cost savings efforts. For sponsored federal research, public organizations have the potential of capturing more accurate costs estimates for overhead expenses.

Public organizations also need to account for the new threats of terrorism that are no longer a veiled threat of danger. In most public organizations, hazardous materials (HAZMAT) are present in facilities in the form of cleaning supplies, building maintenance or research materials that could be potential used in destructive or deadly devices. For public organizations, HAZMAT issues present new challenges combined with a new awareness of a need for increased security concerns.

In this aspect space management and logistical tracking is a vital administrative component at organizations in the public sector. A variety of software products have been developed by multiple vendors specifically to handle data on building space and to generate reports to administration and state and federal agencies. However, when software becomes a burden to use rather than an asset or if the software is incompatible with the institution's current systems such off the shelf products with limited flexibility can quickly become an expensive liability

The purpose of this report is to relate the process by which administrative personnel at The University of Texas at Dallas planned and constructed a new flexible, scalable space management system that is compatible with a wide variety of computing environments, takes into consideration the University's current and future needs and is designed with sensitivity to the various skill levels of the end users.

Assessing Need

In 1998, The University of Texas at Dallas replaced its mainframe space management system (DSPACE) with a new space management system (SMS). This system was programmed by KPMG with a Powerbuilder 2.0 platform. SMS had several shortcomings. With SMS residing on a Powerbuilder 2.0 platform, the program was vulnerable to Y2K issues but also was ponderous and difficult for people with minimal computer training to use. As a result, information necessary to inform the federal government of space allocation, purpose of space, and personnel occupation of space was not kept current.

Time that could have been dedicated to producing reports and making analyses was instead used for lengthy data retrieval and data input. While it was agreed that a new system was required, no funds had been allocated to purchase a new system from a vendor in a timely fashion. Furthermore, there was not a new system that could be installed to meet the university's needs without considerable "patching" and additional expense. The decision was made to construct a new system utilizing existing platform software available to the university.

The design of the new Logistical Tracking System (LTS) was influenced by present and anticipated needs. Aware that UTD is experiencing phenomenal enrollment growth that shows no signs of slowing and that UTD is - rapidly expanding its facilities to keep up with this growth, LTS was designed to accommodate a physical inventory and management system much larger than currently exists. The Office of Strategic Planning and Analysis, with its programming experience, store of institutional data and projections, joined with the Office of the Controller, the ultimate end-user of the new system, to ascertain key needs and eliminate current inefficiencies.

Prior to the existence of LTS, space usage surveys were updated through the use of paper questionnaires. The surveys were mailed out to departments and completed by departmental administrative assistants or program heads. Due to the great demand this placed on personnel time, the survey was conducted only once every three years. There was always a great deal of tension generated by this process that usually ended with the Academic Dean(s) being

contacted by one of the Executive Directors in the central administration. Eventually, once the paper surveys were returned to the Office of the Controller, their personnel keyed all the data into the old SMS system. Prior to SMS, this information was not kept electronically. This method was extremely time consuming, wasteful of paper and inefficient and inaccurate. If there were any positive aspects to this method, it was that those who completed the survey understood how to enter the data onto the forms with minimal training. In this regard, however, there operated a "logic of confidence" that the people entering the data were actually surveying the space. It was never audited in such a way to tell what errors might be made until audit checks were performed by OSPA later in the year. Inevitably errors were discovered, and the cycle would begin of OSPA correctly the SMS system and then the data lagging behind the rapid development of the university. The data was very secure and simply incorrect! . When UTD was a small institution, this process was barely manageable and the personnel involved accepted without question the laborious and error prone process. Neither the Executive Director of OSPA nor the Controller were as accepting. OSPA, in particular, because of its unique structural position at the university was acutely sensitized to the seriousness of the problem. OSPA had to routinely attempt to synchronize the SMS system with facilities data in other systems (which also had inaccuracies!) Part of the reason for the current situation was that the various databases were "owned" by departments reporting to separate Vice Presidents—in effect creating data silos. The situation was simply untenable in light of the rapid growth of the university and its needs for accurate, timely and reliable data. With the deadline for the NSF 2001 Indirect Cost Survey looming and a literal mountain of paper that had yet to be processed, OSPA redirected staff resources and the Space Inventory Database (SID) built on ACCESS was created to fulfill the needs of the moment quickly, accurately and efficiently. LTS was created to automate and track information accurately that had not previously been collected before.

The Planning Stages

OSPA is acutely aware of the difficulties other departments experience with data entry and manipulation. OSPA personnel are unique in that not only do several individuals possess programming capability and can create reports directly from the mainframe to their own specifications, but they are also one of the largest end users of data from virtually all the databases on the mainframe and on PC platforms. Despite their advanced skills, many members of OSPA have found the databases to be difficult and time-consuming to use. Conversations with other departments and audit checks revealed even greater difficulty and frustration.

The Office of the Controller, prompted by their deadline for the NSF 2001 Indirect Cost Survey, placed a formal request for assistance with OSPA. OSPA was initially asked by the Controller's Office to reload data into the old SMS system. This request was rejected based on the inefficiencies of loading new data into an old system that would not solve the basic problems dealing with inaccuracy or inefficiency. OSPA then proposed a new database design to the Controller's Office. The proposal for a new design was accepted, and OSPA in conjunction with the Controller's Office then began to build the initial SID system. Beyond the technical considerations of constructing a computer database, issues regarding expected data use, security, departmental responsibility and administrative expectation had to be met prior to commencement of the project.

The development of a new logistical tracking system can foster several imposing challenges. More obvious issues involve technical difficulties. The importation of existing data into the new tables can create serious problems if the information is exported from the old system incorrectly. Even something as mundane as incorrect specification of character length in a column can sabotage the effort. After a data conversion, time must be set aside to ensure the dataset is completely free of error. This saves a great deal of effort in the future and is worth the initial investment of time and personnel.

In an academic setting, political issues have the potential to be just as debilitating if not handled appropriately. The creation of SID necessitated cooperation among many departments and a pooling of personnel and financial resources. Convincing existing personnel that processes and systems have to be redesigned for the betterment of the University will be an ongoing process. Even after production status, skeptics remain of designing a database system in-house. Other personnel who traditionally used only mainframe technology, are distrustful and threatened by a new technology being utilized for such a project. To avoid miscommunication on a project of this size, it is necessary to hold a meeting of all involved parties to clearly delineate responsibilities, to ensure that everyone understands and agrees upon the purpose and implications of the project, to demonstrate the capabilities and, more importantly, the limitations of the new system.

Those attending the initial meeting had computer skills that ranged from minimal to extremely advanced. Some who attended had low expectations from the system and only wished to see one or two reports as a result of the effort while others wanted a system that could maintain the data automatically and accommodate every conceivable query! Importance should be stressed on establishing the capabilities of the system before the system is complete. OSPA and the Office of the Controller kept these issues in mind when conducting a joint presentation to the Senior Vice President of Business Affairs and various other directors prior to project initialization.

The basic design structure and logic was outlined, required resources were listed, a budget was proposed, and a list of commit-

ted personnel was submitted. Careful planning and open communication with all involved parties resulted in a successful project largely free from the serious political infighting and disappointment that result from mistaken expectations.

Design Structure and Logic

Once institutional need was assessed and identified, database design and table layout were carefully planned. The table structure of the database is critically important for deciding how many tables would be needed and what information would be contained in each table. For the purposes of creating flexible and intricate queries, several smaller tables are preferable with specific, well-defined characteristics. The more variables that are placed into one table, the less flexible that table becomes in answering administrative questions regarding facility planning, processing information, and web page interface design. Relations among tables are easily created yielding many permutations, which in turn could produce reports of detail and sophistication tailored to the needs of the end user.

Such relations are not possible without standardization of the data. For example, the building codes in a building table must match the building codes in a room table. Between two tables there must exist one data field that is common to both, or the tables cannot relate properly. Furthermore, the data contained within the common field must be consistently input or the relation will produce erroneous data. Please note the entry examples below as an illustration of this concept:

In the building table, the code for the hypothetical building is "MP". In the room table, the first field contains the building code and the second field contains the room number. Since the building codes in the two tables are identical these two tables can be related for querying. Also note that room listings and master building information have been placed in two separate tables rather than

combined into a large master table. This is an example of how the creation of smaller tables can yield a flexible, customized report.

Relating information from the tables is carried out by programming code on the data reporting side of the system. For those individuals who have read-only access to the database, web pages have been designed to relate features compiled through coding in the database. Once the tables have been related successfully, the next phase is planning how personnel will interact with the database that had just been created.

Initial Resources that were Required

SID utilizes ACCESS, a Microsoft product. There were multiple reasons that made utilization of ACCESS highly attractive. The University already owns a license for Microsoft ACCESS 2000, thereby eliminating additional software costs. Secondly, the designers of the new SID system were experienced with ACCESS and Visual Basic coding and can train future users effectively. ORACLE is too expensive, very difficult to use, and would require a new server to be purchased. The users had no previous experience with MYSQL. Filemaker Pro was considered too slow and was deemed not to interface well with ACCESS databases. ACCESS allows more than one user to use the system simultaneously, an important ability in an environment where it is typical to find multiple people working on the same task during the same business hours to fulfill tight deadlines. ACCESS allows strong security protocols to be established. Not only can forms be created to meet the specific needs of each department, access to these forms can be restricted to prevent outside tampering, even from other departments who have clearance to use the primary system. Finally, a system utilizing ACCESS can be accessible onto an Intranet for ease of data entry or reporting.

Creating forms for data entry and editing is simple compared to the systems already in use by the University. In this manner the

ROOM TABLE			BUILDING TABLE
Building	Room_No		Building
MP	2.408		MP

database can have various forms created for specific departmental needs. Forms also enable various levels of access into the system, from full access to all data entry and reports to highly restricted access for limited data entry and reporting capability. The data entry form fields can even be locked for read-only access. Such a feature grants greater control over the database and can reduce the number of accidental errors that can occur. On SID, several forms were created to restrict access to certain areas in the database.

The following is a list of completed forms:

1. Property Administrator Form – Room and Building data entry and editing for characteristics only, state reports and E&G report access.

2. Controller's Form – Some limited editing ability in the room use, department and department number. Can access different reports for NSF Indirect Cost Proposal.

3. Room Survey Form – This allows an administrative assistant to fill out the Space Survey online. This form is data entry only with a "point-and-click" interface.

4. Coordinating Board Facilities Inventory Report – State of Texas Report for Facilities.

When Visual Basic scripting is combined with ACCESS forms or Microsoft InterDev, greater data accuracy can be ensured and simplification of data entry can be achieved. In the case of the Room Survey Form, Visual Basic scripting is added to simplify the process for the user and to ensure correct data entry. The Room Survey Form allows the user to select the correct building and room number before the user attempts to enter information for that area. The next part of the Room Survey Form allows the user to enter (via the point-and-click feature) the occupancy level for the area. Finally the user fills in the CIP code and the percentage. Visual Basic scripting ensures that the percentage will total out to 100% and will not permit the user to continue to the next section if the percentage does not equal 100% or if other erroneous data is entered, such as a name where a numerical value should be typed. This forces the user to correct errors before continuing to the next screen.

Once the forms are built, queries and reports can be created in ACCESS or InterDev and linked to simple command buttons on the forms or through the web to connect to the database. A query filters data to produce a table while a report presents the information in a professional format that can include headers, page numbers and the day and time the report was created. Reports can be set up to download their results into an EXCEL spreadsheet or in text format so that the end user can manipulate the data in whatever manner desired. Maintaining the data in electronic format

that is downloaded directly from system to desktop is more efficient than the production of hardcopy and more secure than sending information via a floppy disk or email. In LTS, this is accomplished by using SSL for the transmission of data through the web page to the SQL Server database. Queries and reports can be produced more quickly on a PC application than it can on a mainframe and does not require the services of a programmer to manufacture a given set of data.

The first use for SID was the creation of the NSF Indirect Cost Proposal Space Survey. ACCESS-based SID easily handled the approximately 5,000 records that were downloaded from the old system. The linked tables reduced the amount of time involved in the completion of the survey substantially, and eliminated the need for the Office of the Controller to perform the extensive data entry that it customarily performed. SID is housed on a secure network drive and is accessible by only a very limited number of people within OSPA, Property Administration and the Office of the Controller.

LTS

Despite the initial success of SID, it soon became apparent that utilizing ACCESS was an interim solution and that a more powerful platform was needed to accommodate new enhancements that were envisioned by the team. Initial success with SID prompted the development team to proceed with LTS, a different and more advanced, user-friendly software application that had unprecedented capabilities and functionality. This version is planned for wider use among the administrative community with more capabilities maintained by various departments. Microsoft SQL Server 2000 software is the logical choice for LTS not only for flexibility and power, but also for its affordability thanks to an agreement between Microsoft Corporation and The University of Texas System. Microsoft SQL Server 2000 has the advantage of being able to join seamlessly to other Microsoft SQL Server 2000 databases and to interface with Web FOCUS or Microsoft InterDev. PC SAS users can analyze the data by looking directly into the Microsoft SQL Server tables. There is great demand for integration of a geographic information system for campus mapping. ESRI, a producer of GIS software, has an SDE module that can convert drawings and dimensions rendered in ArcView and ArcInfo into Microsoft SQL Server data.

For the creation of LTS, SQL Server 2000 was installed onto a Windows 2000 Server. Data was then migrated from the ACCESS tables housed on SID to Microsoft SQL Server 2000. Microsoft InterDev was chosen to create the new "point-and-click" data entry screens that would completely replace any of the ACCESS database forms utilized by SID. The web interface option is considered visually cleaner, less intimidating and is more user oriented for those who have minimal computer skills.

SID is housed on the secure network drive, the database is currently protected by network security protocol. With LTS housed on a Microsoft SQL server and featuring a web interface, the system is more vulnerable to outside hacking and required stronger security measures. This arrangement also necessitated the instigation of user ID's and passwords. The decision was to restrict access to the various web pages and the database by using the domain and the creation of Security Groups to secure LTS. This secures the system by way of the server and utilizes security protocols already put in place by the Information Resources department.

In the security procedures, the developers would not be responsible for maintaining security of the system on an administrative basis once the Domain and Security Groups were established in the code. Status of LTS web pages:

1. Intro Page - Complete

2. Menu Pages – Complete

3. Add New Building Page – Complete – Add new building into the database.

4. Add New Room Page – Complete – Add new room into the database.

5. Edit Building Page – Complete – Edit existing building information.

6. Edit Room page – Complete – Edit existing room information.

7. Coordinating Board Facilities Inventory Report Page – Complete – State Report.

8. Room Survey Page – Complete – Used for NSF Indirect Cost Survey, data entry.

9. Room Report Query Page – Complete - Reporting page for information on Room Facilities.

10. Building Report Query Page – Complete - Reporting page for information on Building Facilities.

11. Contracts and Grants Page – Data entry for Contract and Grant information for the NSF Indirect Cost Survey.

12. Telecommunications Module – (Working On) – Records data for PBX switches, lines, work orders, etc.

13. Report pages – Various report query pages.

14. Room Scheduling Page – (Planned) – Complete room scheduling in order to keep track of space utilization.

15. Coordinating Board Report 005 – (Planned) – State Report that must match the Facilities Inventory Report.

16. Security/EMS Module – (Working on)

The Future

Soon after the SID was put into production, users began to ask questions at increasing efficiency and facilitating ease of use. Administrative assistants and other lower level personnel, many of whom have limited formal computer training if any at all, preferred the "point-and-click" graphic user interface more often seen on Internet sites to the more complex database forms. Senior administrators wanted easy access to facilities information that was compiled in a professional report format. The property administrator wanted to use one form to input data, produce reports, and perform edit functions on room and building tables. Departments that maintained their own databases on their room and building information wanted to be able to match their data to the larger campus database. There is also a demand for an accurate square footage count of UTD's facilities.

Until now, great accuracy had been unobtainable due to multiple remodels and the unusual curved shapes of some rooms. Even small issues, such as how to help students find their classrooms on the notoriously labyrinthine campus, needed to be addressed. Other pertinent issues included security concerns with regard to multiple users on an intranet interface. Related to this is the desire to restrict access for data entry personnel to a few key tables while enabling senior administrators to maintain full access to all data on demand.

Another issue is the new system's ability to handle a significant future upgrade to ORACLE or some comparable system if necessary. Even more important was the scalability of the new system. Can it continue to perform if the enrollment doubled or tripled and facilities had to be quickly constructed to accommodate the increase? The year 2001 saw the establishment of a Strategic Enrollment Committee designed to plan future enrollment growth and a proportional growth in services and facilities. The committee, populated by top UTD administrators, was keenly interested in the answer to that question.

LTS will also allow GIS to interface with Microsoft SQL Server. The current CAD system drawings must be modified in GIS and assigned coordinates to facilitate the accurate calculation of square footage. This will also make it possible to publish floor plans with drill down capability onto the Internet. LTS allows for physical plant systems to be mapped down to an accurate and scaleable detail.

Future LTS capabilities

The future version of LTS will have the capacity to publish the GIS campus maps and floor plans on the Internet. This advanced capability will enable prospective students to visit the campus virtually and help new students locate their classrooms via the web. This feature can be combined with Emergency systems, Security systems, and Telecommunication systems to accurately locate and maintain such systems as security cameras, call boxes and telecommunication lines.

Also planned is to use LTS for tracking inventory and other high priced inventory through radio frequency identification (RFID) tags that can track inventory throughout the facilities as items are being moved by an individual.

Additional Features

SID still remains a viable, simple and elegant database solution and is the best version for those departments that plan to convert from the mainframe that have few facilities and do not need the capability of GIS or Microsoft SQL Server.

Currently, testing has been completed to link the University's GIS system to LTS that now feeds room measurements and characteristics into the database. This will eliminate the need for the Property Administrator to input the physical data manually, thus saving time and preventing inaccuracies in the database. LTS users can also view the GIS floor plans online as well as see the information for each floor of an individual building. Web FOCUS could be another possible addition, which would enable departments to retrieve certain reports directly off the space inventory system.

Conclusion

What started as a simple request for assistance became a large-scale endeavor to improve the University's entire space inventory structure. The transition is not undertaken lightly, but the need is too great, the possible return on investment of time and limited departmental funds are very encouraging, and the impetus to succeed is sufficient to take up the challenge. Careful planning, close cooperative effort, strong lines of communication and insightful design enabled the LTS project to succeed.

Early results already suggest that the workload for personnel in the Office of the Controller has substantially decreased in regards to completion of the NSF Indirect Cost surveys, for data entry, and for reporting to other departments. The time saved from using SID can now be applied toward other endeavors. The high

levels of exhaustion and frustration engendered by the old space management system have been reduced through the use of both SID and LTS. LTS has also ensured greater data accuracy. Furthermore, it has allowed for unprecedented levels of cooperation among departments, maximizing the effectiveness of everyone's efforts and minimizing wasteful activity and miscommunication. Above all, LTS has empowered personnel to do their jobs more quickly and effectively, which is ultimately the primary purpose of all computer systems. In 2003, the LTS software was licensed to Emerging Foundations to provide other companies and public organizations a means of keeping control of inventory, facilities and other logistical concerns.

Public organizations in general will need to address the issues of costs and protection in the regard to facilities and personnel. There are many facilities that are high dollar investments that dictate an increase in accurate information for the police, fire, and safety crews to rely on in case of accidents, acts of terrorism, or criminal act. An increase in information has the potential to allow response crews to act more efficiently, flexible and effectively to a given crisis. Controlling inventory can potentially allow for expenditures to be reduced if for example RFID tagging is instituted on high dollar inventory items. A system such as LTS can allow a public entity to connect several different operational areas into one software package that allows for data entry to be more accurate and usable by the different areas of operation. With the use of GIS, utility costs can also be calculated accurately per year in order to further reduce or control costs for facilities. Many public entities are currently operating under tightening budgets and below staffing requirements in wake of the current nation's economic conditions. With a tool such as LTS, public organizations can begin to address the areas of costs and infrastructure protection.

Leadership — Does Style Matter in a Non-Profit Agency?

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Introduction

Is Leader-Member Exchange leadership management style (Northhouse, 2004) asuccessful leadership strategy for a non-profit agency in terms of providing functional adult literacy services to non-English speaking parents of school children? The definition of functional literacy is found in Public Law 102-73, the National Literacy Act of 1991, 102nd Congress -- SEC. 3. DEFINITION.

> For purposes of this Act the term "literacy" means an individual's ability to read, write, and speak in English, and compute and solve problems at levels of proficiency necessary to function on the job and in society, to achieve one's goals, and develop one's knowledge and potential.

Congress's literacy skill definition is at a level above that currently expected by non-English speaking clients to possess in this non-profit agency's client base. However, we wish to obtain that level of skill while also meet the spirit of Congressional literacy intent. As a result, we are partially altering the definition above to describe this tutoring situation.

This alteration in the definition related to this agency's mission statement follows: the mission of this non-profit agency is providing basic functional literacy English skills (words, phrases, sentences, simple mathematics) relevant to the situation(s) facing non-English speaking parents of those children enrolled in the Richardson Independent School District (RISD). The population within a five-mile radius of the area surrounding the district contains 53,478 people, 25% of whom speak English as a second language in their home or who speak English "less than very well". RISD reports sixty-one non- English languages spoken in those homes (U.S. Census 2000, RISD 2001). The non-English speaking parents are at a disadvantage if they cannot assist their children in homework or other related school activities requiring functional English skills to participate. The children of these parents are also at a communication disadvantage at school and home if their parents do not acquire functional English literacy skills. An especially difficult aspect to our tutor services will be addressing the special needs of non-English speaking parents with disabilities. An interactive approach will be taken urging parents and their children to participate together. There is a substantial body of educational research on the benefits of this approach.

Discussion

There are numerous widely studied and applied styles of leadership in managing non-profit organizations, (Lewis & Plas, (2001); Northouse, 2004; Burke, 2002; Terry, 2003). Such as the Situational Approach, Leader-Member Exchange Approach, Path-Goal Approach, Transformational Approach and Team Leadership Approach, etc. All of these approaches contain some related similar elements such as clear, concise and frequent communication between the leader and subordinates, clear mission goals, competencies, team building and leading, etc. Although most might work well in a non-profit agency, (Lewis and Plas, 2001) they are good examples of, "typical, traditional management models." For this non-profit agency the search is for the best fit to its unique mission –no paid administrative staff, volunteer staff only.Lewis and Plas (2001), "...presence or absence of profit motive and use of volunteer personnel constitute critical differences that, for some, create the conclusion that any transfer of management methods from one to the other type of organization is inappropriate...". This non-profit agency centers on client and volunteer intensive participation created and sustained by the leader's competencies, communication skills along with the ability of simultaneously attracting internal and external stakeholders. Of all of the approaches above the Leader-Member Exchange approach is selected for this non-profit agency.

The Leader-Member Exchange approach leadership style is particularly suited for managing successfully in our specific client-tutoring environment. We confine the parameters of our discussion to a description of Leader-Member Exchange leadership management elements described in the Northhouse text:

> Leadership making is a prescriptive approach to leadership that emphasizes that a leader should develop high-quality exchanges with all of his or her subordinates, rather than just a few. It attempts to make every subordinate feel as if he or she is a part of the in-group and, by so doing, avoids the inequities and negative

implications of being in an out-group. In general, leadership making promotes building partnerships in which leader tries to build effective dyads with all employees in the work unit (Graen & Uhl-Bien, 1995). In addition leadership making suggests that leaders can create networks of partnerships throughout the organization, which will benefit the organization's goals as well as their own career progress (Northhouse, 2004: 151).

In addition to those descriptors by Northouse, the leader-member exchange leadership style in our nonprofit agency must reach out beyond just the agency's volunteer tutors, other volunteers and goals. This style of leadership is consciously and specifically adapted to our specific non-profit environment, especially with respect to managing the persons receiving tutor services. External/internal stakeholders and embedded associations are entities who can choose not participate in the agency tutoring process seriously affecting the success of this agency to fulfill its mission, so the leader must recruit and sustain their participation. Inclusive negotiation as opposed to coercion is the attitude of the leader-member exchange style. Hence "selling" the mission and obtaining widespread enthusiastic participation is the core of the agency's teaching facility acquisitions, funding acquisitions and outcome success.In order to accomplish this mission and fit into Northouse's Leader-Member Exchange style, the following leadership characteristics are relevant: empathy, emotional intelligence, engaging in dyadic relationships, *leadership charisma, leadership values* and competency. The ability to attract supporters, clients and embedded group interests are necessary performance competency factors as well for the Leader-Member Exchange style. Reaching out and going to insular client communities or clusters of clients is important for the leader in attracting the special needs clients to the agency. Many clients will not attend simply based on agency advertisement. Recruitment undertaken by the leader to generate trust that enrolling and then participating in the tutoring process by the clients is clearly apparent to them to be in their best interest.

In this "prescriptive approach", the first sought after trait on the list of leadership selection criteria is *leadership charisma*. Staffed by volunteers who believe in the mission the agency needs a leader and manager that is charismatic in their interactive relationships with the volunteer staff, the tutor clients, their families and supporters. In addition our leader/manager must be charismatic in relationships with the RISD teachers, staff and embedded associations, e.g. culture groups, classroom teachers associations, religious organizations, etc. Merriam-Webster's Dictionary (1997), defines charisma as, "…a personal magic of leadership arousing special popular loyalty or enthusiasm…". Why must the Leader-Member Exchange leadership style manager have this "charisma"? This leader must attract and be attracted to, to sustain participation by the clients needing services, the volunteers, internal/external stakeholders and embedded interest groups. They all must want to participate as a result of their own sense of self gratification and a sense of wanting to enrich the lives of all the people in the community which the leader leads them to do.

It follows that a charismatic leader in this environment must possess hands on charismatic skills enabling them to successfully network formally and informally. So that the process of acquiring tutors first, obtaining free teaching facilities second and procure funding, such as donations and grants or other aid by supporters. Sixty-two different languages are spoken by the tutor clients is reflective of the scope and depth of the interactive relationships. Relationships that would require charismatic qualities and the ability to handle disputes, distrust, competing interests and embedded group interests. As an example an article in a local newspaper reported, "Chinese teachers talk shop, 90 language instructors in region, 3 from China discuss challenges…As if teaching a foreign language weren't hard enough, try developing a lesson plan that appeals to both a young child and a middle-aged man…"(*The Dallas Morning News, 2003,* October 12)Before proceeding further we must take up another issue of importance and that is leadership versus management. Lewis & Plas, (2001) state,

> *When you hear people use the term management at this-person-centered agency, they are typically referring to leadership functions and management functions—as is in other types of person-centered organizations. Within a person-centered model, a management system necessarily demand leadership skills and functions.*

The Leader-Member Exchange leadership style for this particular non-profit organization must be both leader and manager. The tutor clients, volunteer staff, embedded group interests and external stakeholders will not be managing the organization administratively. Their role is one of direct line providers or one of direct support for the leader/manager since there are no administrative staff employees. The reason for this distinction with respect to the issue of leadership versus management, in this situation, is that this leader must be one and the same, leader and manager. This is an unusual situation, but not unique, when one studies other nonprofits or government organizations where there is management staff subordinate to and answering to the leader, e.g. American Red Cross, United Way, etc. Again see Lewis & Plas, (2001), "typical, traditional management models that nonprofit organizations currently use," for a more in-depth review.

Next is "effective dyads" (Northhouse above) and why they are important to this argument for this leadership management style. Northhouse states

> *,…the nature of the vertical linkages leaders formed with each of their followers…high quality leader-member exchanges produced…good working relationships…partnerships are transformational in that they assist leaders and followers in moving beyond their own self interests to accomplish the greater good of the team and organization.*

Fullan, (2001) and Goleman, (2002) support Northhouse, (2004), and support the position for the Leader-Member Exchange leader-

ship management style in this nonprofit agency. Fullan,, constructs, "A Framework for Leadership" (Figure 1.1) in which he graphically describes the interaction between leaders and members in vertical dyadic relationships, further he quotes Stein and Book (2000) ...emotional intelligence...the ability to read the political and social environment, and landscape them; to intuitively grasp what others want and need...". Goleman, states,"Relationship Management...The triad of self awareness, self management, and empathy all come together in EI ability: relationship management." Goleman's description of empathy coincides with Northhouse above "leaders can create networks of partnerships..." he states,

> *When leaders are able to grasp other people's feelings and perspectives, they access a potent emotional guidance system that keeps what they say and do on track. As such empathy is the sine qua non of all effectiveness in working life. Empathetic people are superb at recognizing and meeting the needs of clients, customers or subordinates.*

As stated previously empathy, emotional intelligence, dyadic relationships, leadership charisma and leadership values in tandem with the ability to attract supporters, clients and embedded group interests are style elements. They are all necessary competency performance factors of the Leader-Member Exchange leadership style for this nonprofit.

What is the basic rationale for acquiring such a high-powered, highly active socially and personally involved individual for our nonprofit? It is the issue of volunteerism. Volunteers are just that and can not be compelled to participate and so the "selling" of our tutor programrequires a type of competitive intelligence *vis-à-vis* other nonprofit agencies--this leader mustfind this agency's niche in providing such services. Northouse states that a leader is concerned with "their own career progress", as well as all of the other things that he/she must do in leading the nonprofit agency. Career progress denotes external and internal entities perceiving that competence exists in the leader's abilities and their ability to get the job done. Maybe they are not an expert authority in their chosen field, but experienced. Competence then acts an attractor for our leader since external perceptions are drivers in believing in the leader, competence "sells" the other leadership qualities. With respect to the role of competence Terry (2003) states, "... competence authority results from the ability to perform certain tasks in a given area...". Which means that to be competent means you get the job done and are perceived as being able to get the job done, thus giving one authority (internal and external respect) in their area of experience.

Anderson & Anderson, (2001) describe a Leadership Competency Model (Figure 3.1, page 56), that fits with the Leader-Member Exchange leadership style, they state, "...externally oriented learners have a greater repertoire of actions and strategies." Bennis & Thomas, (2002) support the above authors as

well, they state, "...competencies...an almost magical ability to transcend adversity...with all its attendant stress, and to emerge stronger than before...the ability to engage others in shared meaning..." These descriptions of competence reflect why the leader of this agency must be an attractor and competence means the ability to convince all of the participants of the agency's leader experience and expertise to accomplish the mission.

Competency can only happen when clearly communicated through specifically targeting the tutor clients, volunteers and embedded interest groups. Popovich, (1998:114) defines his "communication strategy" as "customized" communication "vehicles", which he relates arecritical to nonprofit and government organizations. Kotter, in his book *"Leading Change"* (1996) advises, "Repeat, Repeat, Repeat...The most carefully crafted messages rarely sink deeply into the recipient's consciousness after only one pronouncement."

We have identified and discussed the primary qualities we are seeking for in the leader who is also manager for this nonprofit agency. They are: empathy, emotional intelligence, engaging in dyadic relationships, *leadership charisma, leadership values* and competency. As well as the ability to attract supporters, clients and embedded group interests through competent communication factors.

Conclusion

Traditional leadership styles such as those described by Northouse, (2004, Chapters 2,3,4,5,10,11), Fullan, (2001) Goleman, (2002) and Bennis and & Thomas, (2002) contain elements of the Leader-Member Exchange leadership style of management. The Leader-Member Exchange leadership style employs elements from these authors with respect to empathy, emotional intelligence, engaging in dyadic relationships, *leadership charisma, leadership values and competency. The unusual* characteristics of the mission of this agency require more than just these stated leadership elements. That is the rationale for the criteria used in the selection process of the Leader-Member Exchange leadership style person to lead this non-profit agency.

The Leadership-Member Exchange style contains one important additional element, that it is, "...centered on the *interactions* between leaders and followers..." (Northhouse, 2004). These interactions are of a special nature because of this agency's client tutor base, client disabilities, differing cultures and values of each distinct tutor client cluster of individuals, e.g. Vietnamese, Kurdish, other Asian, Muslim, etc. This "prescriptive approach", driven by *leadership charisma* as an attractor, appeals to both clients, tutors, stakeholders and special interest groups and the non-English speaking clients having special needs, e.g. disabilities beyond language. This will require recruiting into the agency's tutoring program by a leader experienced in approaching and developing interactive relationships with non-English speaking parents in this category. The leader will be required to

required to reach out to these identified insular clusters of non-English speaking parents with disabilities convincing them of the personal and social value of their participation.

Leadership charisma in this instance implies a higher level of sensitivity to both volunteer tutors and clients served. This agency leader must be charismatic as well as experienced in relationships with the RISD teachers, staff and embedded associations, e.g. culture groups, classroom teachers associations, religious organizations, etc. The leader then convinces all who want to participate, that this is of personal value, that it applies to their own sense of self-gratification and to their sense of wanting to enrich the lives of all the people in the community.

Competencies of experience, interacting with individuals, groups and organizations become of importance since they lead to public credibility in leader decisions and behaviors. Modeling these competencies in a transparent way provides confidence. Leader-Member Exchange "dyadic" (Northouse, 2004) relationships as described earlier are vehicles for which the leader can use to accomplish this part of the leadership mission. Dyadic relationships provide constant movement and adjustment in personal interactions relating to the mission and goals of the agency in tutoring the non-English speaking parents and their children. These relationships focused on "how the quality of leader-member exchanges was related to positive outcomes for leaders, followers, groups, and the organization in general..." (Northouse, 2004).

Lewis and Plas do not use the term "dyadic" but they do describe the same characteristics of a dyadic relationship and its application to leading non-profit agencies in particular. They state,"Person-centered leadership, an approach to participatory management that has shown to be impressively and...seems uniquely suited for use in a variety of nonprofit settings...that have obvious person-centered components..." (Lewis and Plas, 2001).

For this non-profit agency Northouse, along with Lewis and Plas's describe how and where this agency leadership will obtain its "Emotional Intelligence" (Goleman, 2002). Goleman states, "More than anyone else, the boss creates conditions that directly determine people's ability to work well." The Leader-Member Exchange style of leading characteristics, as described and supported by others throughout this paper, provides the selection guidelines for recruiting, interviewing and hiring the leader for this non-profit agency.

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The Role of Liberty in the Schumpeterian Paradigm

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Introduction

Among the twentieth century economists that can be described as defenders of capitalism the work of Joseph Schumpeter stands apart. However, perhaps the most intriguing and perplexing aspect of Schumpeter's work is not what is present, but rather what is absent. Although the differences among the economists and theorists that are considered proponents of capitalism and what has come to be known as the free market system are legion, it is difficult to dispute that some common themes emerge.

One of the themes that seems to be common to free market economists and theorists is a belief in the desirability and necessity of individual liberty. It would be difficult to dispute that for many if not most of capitalism's defenders a belief in the necessity and desirability of individual liberty becomes the center piece of their theoretical constructs. Schumpeter's work, however, is almost devoid of any discussion of individual liberty. It would certainly be difficult to argue that liberty rather for good or ill is of any great importance much less central to Schumpeter's theories. The relative unimportance of individual liberty to Shcumpeter produces what is arguably the greatest difference between Shcumpeter's work and that of his contemporary defenders of capitalism. This paper will argue that the reason for this difference is that in fact Schumpeter's work springs from a different intellectual tradition than does that of his contemporaries. It is believed that as F.A. von Hayek first argued in his essay "Liberalism" there are in fact two differing strains of classical liberalism. One with individual liberty at its core and another based upon rationalism.[1] These two intellectual traditions differ primarily in their perspectives on the ability of artificially created institutions to solve societies problems.[2] The first intellectual tradition is described as:

> One tradition rooted in classical antiquity and in certain medieval traditions assumed its modern form in the political doctrines of the English Whigs in the late seventeenth and early eighteenth centuries.[3]

This is the liberal tradition of Adam Smith, and Gladstone. This is also quite arguably the tradition the work of Mises and Hayek are most closely aligned with. This is the liberalism that is tradi-tionally distrustful of governmental interference in economic affairs and contends social progress evolves from the voluntary associations of free individuals as guided by their own self interest and the rule of law. These forces coming together in the complete absence of state planning are the well spring of human progress. Their is, however, a second liberal intellectual tradition. This is perhaps the liberal tradition from which Schumpeter draws most heavily. This tradition can best be described as the rationalist or constructiveness view of liberalism. This is a view that "...demands a deliberate reconstruction of the whole of society in accordance with the principles of reason." [4]

This view is quite different from the liberalism of the English Whig traditions. This is a liberalism that believes that human reason and rationalism can design or create useful and beneficial social institutions. This is a liberalism that does not see voluntary association but rather rationally created institutions enforcing rationally derived norms and rules as the cornerstone of human progress. In the late twentieth century we are used to observing the champions of capitalism staking out a position that is firmly in the camp of Whiggish liberals. As was noted earlier Schumpeter is a defender of capitalism, but just as clearly his defense is not grounded in the notions of Whiggish liberalism we have become used to seeing.

Schumpeter's neglect of individual liberty which appears strangely inconsistent when examined form the Whiggish perspective actually becomes quite natural when one concludes that he is in fact working from a rationalist perspective. When Schumpeter's work is taken as a rationalist perspective of capitalism what was once opaque and illusive actually is seen to naturally flow from the intellectual tradition from which Schumpeter was drawing. Schumpeter, working from the rationalist tradition rather than the Whiggish tradition of liberalism naturally lead him to many different conclusions than his contemporaries. However, none is more significant than his trivialization of the importance of the individual liberty.

Schumpeter never clearly and unambiguously endorsed any particular philosophy. His image of the role of a social scientist caused him to attempt to divorce his work from his ideology. However, an examination of Schumpeter's work clearly shows

that he is a follower of the rationalist liberal tradition rather than the liberal tradition of the English Whigs. This rationalist world view is in all probability what led to Schumpeter's view that individual liberty was of no great significance.

Mises, Hayek and the Whiggish Tradition

In attempting to establish a working definition for the rationalist liberal world view it would be useful to clearly distinguish this form the world view derived from the Whiggish tradition. Few would argue that Ludwig von Mises, and F.A. von Hayek were anything other than staunch defenders of capitalism and classical liberals. However, it is not just the positions of Mises and Hayek that make a comparison of their views with those of Shcumpeter particularly instructive. A comparison between Schumpeter's views and those of Mises and Hayek is also particularly instructive because of the striking similarity of their backgrounds.

They were all of the same generation and all Austrians by birth trained in similar institutions and affected by and wrote in response to the same forces. For the sake of clarity it should be noted that for these purposes Austrian is being used in its national sense and not to describe a particular school of economic thought. The question of whether Shcumpeter can be described as an Austrian Economist is not addressed here. All these men experienced the disruptions and radical reorganization to their world by the First World War. Schumpeter, Mises, and Hayek all wrote a approximately the same period of time and in response to the same issues. It would also be fair to describe all of these men as defenders of capitalism. This at first blush would lead one to expect a great deal of similarity in the views of these men. This, however is not the case.

Their views of capitalism and the role played by individual liberty are quite different. The work of Mises and Hayek are clearly from the Whiggish intellectual tradition and both place a great deal of importance on the role of individual liberty. Shumpeter just as clearly does not. The fact that all of these men were attempting to defend capitalistic institutions and were writing is response to the same issues make the differences all the more striking. In all probability the differences in the views of these men result from a profound difference in their world views.

This may be explained by the intellectual traditions from which the different men worked. Working in the tradition of the English Whigs Mises makes individual liberty the corner stone of his their theory of political economy. Mises contended that individual liberty flowed form the free market and without free markets freedom itself becomes a mere illusion.[6] Mises views of the interrelationship between the free market and individual liberty were probably best stated in his book Of Human Action, when he wrote;

As soon as the economic freedom which the market economy grants to its members is removed, all political liberties and bills of rights become humbug. Habeas corpus and trial by jury are a sham if, under the pretext of economic expediency, the authority has full power to relegate every citizen it dislikes to the arctic or to a desert and to assign him to "hard labor" for life. Freedom of the press is a mere blind if the authority controls all the printing offices and paper plants. And so are all the other rights of man.[7]

Mises firmly believed that economic freedom was inexorably intertwined with individual liberty. In responding to the argument that it was indeed possible to separate the economic aspects of life from the non economic aspect of life Mises contended the two were clearly inseparable and any attempt to argue human life could be separated into spheres of activity was in fact spurious. This as we shall see is a stark contrast to Shcumpeter's views on human activity and the division of life into differing spheres.

For von Mises individual liberty and capitalism were inexorably entertwined and what strengthened one would strengthen the other. Schumpeter positively rejected this belief. Schumpeter, made it clear that he believed that during the middle ages all of human activity had been encompassed by one sphere. However, the emergence of capitalism had broken mens lives into two spheres of activity. Schumpeter accepted the notion of private and public spheres of activity. This seemed so clear to Schumpeter that in Capitalism, Socialism, and Democracy, Schumpeter wrote;

The outstanding feature of commercial society is the division between the private and public sphere -or if you prefer, the fact that in commercial society is a private sphere which contains so much more than either feudal or socialist society allocates to it. This private sphere is distinct form the public sphere not only conceptually but actually.[10]

In Capitalism, Socialism and Democracy, Schumpeter makes it clear that it is his belief that equivalent levels of individual liberty can be had under either capitalism or socialism. He states very plainly that it is indeed possible to be beholden to a central planning authority in one area of activity and yet enjoy a great deal of individual freedom in another.[11]

The contrast between the Whiggish liberal tradition advocated by Mises and in this example represented by Gladstone and the rationalist views of Schumpeter is made very clear. In Schumpeter's essay the Crisis of the Tax State. In this essay Schumpeter contends that raising taxes beyond a certain level can actually have a

revenue depressing effect. He contends that during Gladstone's time as prime minister the revenue depressing point of taxation had been reached. He approvingly cites Gladstone's policies as brilliant, implying that Gladstone deliberately cut taxes to raise revenue.[12]

However, the motives implied by Schumpeter were far from those actually held by Gladstone. Gladstone's tax cuts were designed to impoverish the government. Gladstone believed that a poorer government made for a richer state. Gladstone also believed that an impoverished government was less of a threat to liberty than a rich government.[13] This example clearly illustrates the different conclusions the two varying intellectual traditions can lead one too. Gladstone the liberal of the English Whig traditions seeking a poorer weaker government to preserve liberty and Schumpeter the rationalist believing that positive advantages could be seen in tax rates that maximized revenue and minimized the negative affects on industry.

This linkage commented upon by not only Mises and Hayek, but also numerous other defenders of capitalism was rarely remarked on by Schumpeter and when he did comment upon the issue he discounted the linkage. In Capitalism Socialism and Democracy, Schumpeter conceded that there was some linkage between individual freedom and capitalism but he argued that socialism would not inevitably lead to the decline in individual liberty that many argued it would and that even if it did that would be of little consequence.[14] This position is clearly quite contrary to the views of most of capitalism traditional defenders.

The notions of the democracy of the markets commonly advocated by most of capitalism's defender's were far from representative of Schumpeter's views. Schumpeter in fact believed that the majority was often simply manipulated by the market. His theory of the entrepreneur envisioned a demand that was created by the entrepreneur.[15] Schumpeter argued that rather than satisfying genuine human demand the entrepreneur simply filled a need he had created. This is obviously very contrary to the picture of markets held by the majority of capitalism's champions. In this and many other ways Schumpeter visualizes a very different form of capitalism than is envisioned by these theorists arising from the Whiggish traditions.

Schumpeter's Capitalism

Schumpeter's vision of capitalism contrasts sharply with that of his contemporaries. Rather than the bright and hopeful picture of freedom flowing from markets and mankind being brought together by voluntary transactions, Schumpeter gives us a darker vision.

On the surface Schumpeter gives us a deceptively simple and elegant model of capitalism. At the heart of Schumpeter's model is the entrepreneur. In the Schumpertian system this is a man of great ability and insight who manages to bring the factors of pro-

duction together in new ways. This he does not so much through invention as through innovation. This the entrepreneur does by availing himself of credit and using that credit to recombine the factors of production in a manner that leads to the creation of profits.[16] Schumpeter called this process creative destruction.

This theory of creative destruction was at the very heart of Schumpeter's capitalism. This process of destruction was what Schumpeter saw as the engine that drove capitalism. However, as the name implied the growth provided a shock to the system. Though this shock was the proximate cause of growth it was growth at a price. Growth accompanied by genuine disruption. Schumpeter also believed contended that the success of the entrepreneur would ultimately cause a legion to imitate the entrepreneur. The imitators and the investment that followed them would initially bring in an era of prosperity, but as the inevitable repayments and price changes worked their way through the economy a recession or depression would ultimately result. During the recently enlarged economy would adjust to its increased level of output until a new innovator begins the cycle anew.[17]

Schumpeter saw this process as greatly creative and innovative but also as a system that would bring about its own destruction. He did not subscribe to the Marxian vision of class warfare but rather believed that capitalism's success would ultimately destroy the system.[18] It is interesting to not that Schumpeter saw this process as occurring slowly overtime. He foresaw a gradual institutionalization of innovation. This institutionalization of innovation would render the entrepreneurial function obsolete ultimately slowly but surely then a socialist or some other planned system would emerge.

It is significant to note that the socialist system envisioned by Schumpeter was not the nightmare of tyranny envisioned by von Mises and von Hayek, but rather a cheerless bureaucratic state that though he did not endorse, he also did not fear. In all probability Schumpeter the rationalist saw some genuine advantages to allowing a planning mechanism into the economy. It is quite clear that though Schumpeter was not a socialist by any means he did believe that socialism could poses some advantages over twentieth century capitalism.

Schumpeter's capitalism was also a capitalism that soundly rejected the notion of democratic markets bringing together free actors and promoting maximum efficiency through free exchange. Schumpeter acknowledged that capitalism had indeed in the past and in the future would produce great wealth. However, Schumpeter also saw many frictions and inefficiencies in capitalism that those of the more Whiggish line of thought rejected. Schumpeter saw depressions not as the result of state action but rather as a phenomena produced by capitalism itself. Schumpeter believed that innovations occurred unevenly and this caused periodic maladjustments in the economy. These adjustments would result in a recession or depression until the obsolete and outmoded elements of the economy were absorbed. Though the

equilibrium reached would be at a new and higher point it was a painful and disruptive process fraught with friction.

To one of the English Whig tradition a depression would be considered either a disaster caused by governmental intervention or, the market working democratically to reward those who produced what it was that public desired and would confidently predict a quick return to equilibrium. To a rationalist, however, this would not be an acceptable state of affairs. Schumpeter saw the swings of the business cycles as something that could be conquered by man made institutions. Though Schumpeter did not advocate a governmentally imposed solution he did hint that he was favorably disposed towards a corporatism that shall be examined later.

Another significant indicator of Schumpeter's rationalist roots is ground upon which his defense of capitalism is anchored. As was discussed earlier those grounded in the Whiggish notion of capitalism see the prosperity and productivity they believe emerge from capitalism as a genuine benefit, but they see the maximization of individual liberty within a legal framework as the ultimate goal not the increased wealth.[19] Individual Liberty is seen as an end in and of itself. Schumpeter's support of capitalism is just as clearly predicated on other grounds.

Schumpeter believes that capitalism is an engine that in spite of its frictions has and can continue to create great wealth. He believed that one of the most appealing aspects of capitalism was the opportunities for advancement it offered to the most capable.[20] However, it is important to note that all of these arguments begin and end with efficiency. Schumpeter does not carry these arguments any further to argue that any of this is a worthy goal to pursue in and off itself. He merely makes his case and leaves it on the grounds of efficiency. It can be conceded that Schumpeter's view of the role of the social scientist did prevent in a tendency to attempt to divorce his ideology from his theories. However, it is difficult to argue that the body of his work does not have a distinctly rationalist bent.

Schumpeter's Corporatism

As we have discussed before Schumpeter believed that his role as a social scientist necessitated his hiding of his ideology. However he has left us inklings of what he saw as the alternative to a self destructing capitalism and a cheerless bureaucratized socialism. This alternative that he came to late in his work and probably for that reason was never fully developed was corporatism

It has been pointed out that Schumpeter in a rare speech given in Montreal abandoned his habit of publicly concealing his normative views and advocated a form of corporatism coupled with moral reform.[21] Having developed a cheerless capitalism containing with in it the prescription for its ultimate destruction and viewing socialism as a Byzantine nightmare of bureaucratic ineptitude he had left himself little choice.

In advocating this position an important distinction about Schum-

peter can be made. He does not advocate that associations such as this be brought about by governmental action, Schumpeter even contended that an association such as this was only possible "...by the actions of free men and the faith which inspires them." [22] This illustrates the uniqueness of the position taken by Schumpeter.

It is clear that trade associations such as this would not be acceptable to liberals of the English Whig tradition. The one aspect of governmental regulation of the economy that might be accepted by capitalism's Whiggish defenders is intervention to maintain and promote competition. To a rationalist, however, this position comes quite naturally. What the greater question is exactly what form this association would take. Schumpeter never elaborated on his theory of corporatism to a great extent but from his writings some idea of what he envisioned can be gleaned. At first blush these trade associations seem surprisingly close to the NRA. This is surprising in light of Schumpeter's opposition to the new deal. It is apparent form Schumpeter's work that he saw a capitalism kept alive by New Deal Type programs as worse than socialism. This leads one to believe that the emphasis in Schumpeter's corporatism must be on the voluntary nature of the association. Perhaps Schumpeter's opposition to the New Deal was based on the compulsory nature of the association. However, it is also likely that Schumpeter objected to the bureaucratic nature of the New Deal. Schumpeter theorized that his version of corporatism would be hostile to bureaucracy.[23] This corporatism was Schumpeter's attempt to preserve private enterprise and yet still seek rationalist solutions to what he perceived as capitalism's problems.

Schumpeter's capitalism was also weakened by what he termed friction. In Capitalism, Socialism, and Democracy, Schumpeter's critique of capitalism made some telling points. Though it can be difficult to take Schumpeter too seriously when he is expounding on the joys of consuming socialist bread with rats in it, on the score of inefficiencies Schumpeter's critique cam be compelling.

As we discussed earlier Schumpeter believed that human activity had been divided into two spheres. These two spheres are the public and private. The division of activity into two spheres caused genuine friction between the public and private sectors of life. Schumpeter contended that in a capitalistic system public leadership and private leadership often worked in cross purposes. He contended that a great deal of resources and talent are expended non productively in the conflict between the public and the private aspects of life. Where a liberal from the English Whig tradition would acknowledge that inefficiencies such as this do exist, they would see the solution to this problem in the elimination of the governmental policies that are the cause of the friction. Schumpeter on the other hand argued that the ultimate solution to this problem would be found in some form of planning.[25] This solution would be an anathema to a liberal of the Whiggish tradition but would be quite natural, if on were working from the rationalist perspective.

Conclusion

As we have seen classical liberal though encompasses two traditions. The first tradition which is normally associated with capitalism's defenders has grown out of the English Whig traditions. This is a intellectual tradition that is very distrustful of the power of government and very supportive of capitalism. It could be said that individual liberty is the cornerstone of many traditional defenses of individual liberty. This is the tradition of Mises and Hayek. Schumpeter, on the other hand, did not subscribe to this intellectual tradition. He subscribed to a the second or rationalist strain of classical liberalism. This school of thought believed that the human condition could be bettered by the creation of rationalist institutions. This is the school of thought that provided the intellectual underpinnings of Schumpeter's work. This differing perspective is what causes Schumpeter's work to have a flavor that is so different from that of his contemporaries.

This is also what makes Schumpeter's work so unique. Schumpeter was undoubtedly a European Conservative and a defender of capitalism. Schumpeter's capitalism, however, was in fact quite different from that his contemporaries sought to defend. Schumpeter sought to defend a capitalism that while incredibly productive was also wasteful. While Schumpeter was unable to accept socialism as an alternative he was also unable to accept the a vision of free men acting in their own self interest and maximizing efficiency thought the market. Rejecting both socialism and traditional notions of efficiency being maximized by free men acting in their own self interests Schumpeter was inexorably led to hazy and ill defined corporatism. He had left himself little option. A rationalist who rejects centrally planned socialism, and yet one who also sees very real inefficiencies in capitalism yet acknowledges its tremendous wealth generating potential is left with little choice. One who accepts the potential of capitalism and yet rejects both central planning and the concept of free individuals acting in their self interest as effective regulators has really has no option but to ultimately accept some form of planning. Schumpeter saw corporatism as the most effective and least offensive of these options.

Had Schumpeter accepted maximizing liberty as his ultimate normative value a more vigorous defense of capitalism as the system of the future might have been possible. However, capitalism as Schumpeter accurately pointed out is a messy system. The desire of a rationalist not limited by a fear of infringing on liberty to manage the system in some way proved irresistible.

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What Has Affected the Unemployment Rates in the USA: Preliminary Analysis of the Last 12 Years – Elections and 9/11

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Introduction

With the recent job-cuts and corporate closing downs, there is much speculation about the factors that are contributing to the unemployment rates in the USA. The tragedy of 9/11 is blamed time and again for having 'broken the back of the proverbial camel." But how true is this statement? What are the other factors that effect unemployment? I decided to study the effects of elections and one-time tragedy of September 11 2001 by using a Box-Jenkins Transfer Function and Intervention Model using RATS.

The political business cycle theory studies the interactions between economic policy decisions and political considerations, that is, the business cycle mirrors the timetable of the election cycle. Since voters tend to be concerned with the level and the rate of change of the inflation and unemployment rates, the politicians policies are likely to be highly influenced by these "perceptions of the public". The rate of inflation rate and unemployment rate should be falling if possible and not too high. The political business cycle theory hypothesizes that politicians use restrictive policies early in their administration and later on change them to allow natural rates of unemployment and inflation to bounce back. (Dornbusch, et al, 1998). However this hypothesis is still being debated on but we will try to see if we can work it into our model of unemployment for the purpose of this paper.

The main time-line variables that I selected on the basis of the Aggregate Demand- Aggregate Supply Model were inflation, money supply (M1), trade balance, per capita income and consumer price index. The purpose of considering both the inflation and the consumer price index was to measure both the rate and level of inflation in the economy separately. The interventions I considered were the elections of 1992, 1996, 2000 and the tragedy of 9/11. (See Appendix-i)

This paper is divided into 8 main parts. The Data Explanation and Methodology section talks about the data used for the study and detailed explanations of the variables. The Analysis section talks

about the final model and results of the hypothesis testing. The Conclusion provides the final outcomes. The section on Further Scope talks about the future trends possible for the study. References for this paper are limited to the sources of data and software used for analysis and a list of literature consulted while selecting variables for the study. The Appendix consists of the software coding, tables and graphs that are referenced to in the paper.

Data Explanation and Methodology

The data used for this analysis is primarily time series data ranging from March 1990 to February 2003. The data consists of the following variables – unemployment (UNEMP), inflation (INFL), trade balance (TRADEBAL), per capita income (PCI), money supply M1 (MONSUP) and consumer price index (CPI). For the analysis, it is necessary to have stationary data. Most of these series were non-stationary when tested graphically and by Dickey-Fuller unit-root testing in EVIEWS. (See Appendix-iv). Hence, I took natural logs for UNEMP (UNEMPL), INFL (INFLL), TRADEBAL (TRADL) and MONSUP (MONSUPL). Then I differenced all the above logged variables and PCI and CPI to form the final variables as being – UNEMPLD, INFLLD, MONSUPLD, TRADLD, PCID and CPID.

On graphing all these variables, a reasonable amount of stationarity was found in all except MONSUPLD, so I differenced it again to form MONSUPDD. This was the first step necessary to form individual ARIMA models for the dependent variable UNEMPL and independent variables INFLL, TRADL, MONSUPL, PCI and CPI. The ARIMA models of the form (p,d,q) for all the variables at time t are as follows –

UNEMPL (1,1,0) with 'ar' lag at t-6

INFLL (1,1,1) with 'ar' lag at t-1 and 'ma' lag at t-2

TRADEL (2,1,0) with 'ar' lags at t-1, t-2

MONSUPL (1,2,1) with 'ar' lag at t-1 and 'ma' lag at t-1

PCI (1,1,2) with 'ar' lag at t-1 and 'ma' lags at t-2, t-3

CPI (0,1,0)

Here,

p = number of 'ar' lags

d = number of differences

q = number of 'ma' lags

ar = autoregressive

ma = moving average

Then I tested for the effects of the interventions on the dependent variable by creating dummy variables for each effect. The election of 1992 seems to have a gradual permanent effect on unemployment but the other interventions did not, so I decided to consider only the permanent effect of election of 1992 for my analysis. The next step was pre-whitening the dependent variable with respect to the independent variables. The cross-correlations of the residuals failed to indicate any time lags between the dependent and independent variables.

The final step was the culmination of all this analysis into creating a Box-Jenkins intervention and transfer function model using UNEMPL as the dependent variable.(See Appendix-ii Table 2a) The first analysis showed that the CPI is highly insignificant so I dropped the variable and ran the final model with all the other variables and intervention of the ARIMA model form (2,1,2) with 'ar' lags at t-1 and t-6, 1 difference and 'ma' lags at t-1 and t-2. (See Appendix-ii Table 2b)

The expected equation for UNEMPL is as follows –

$(1-B)UNEMPL_t = [w_0/(1-Bd)](1-B)EL92_t + w_1(1-B)INFLL_t + w_2(1-B)^2MONSUPL_t + w_3(1-B)TRADL_t + w_4(1-B)PCI_t + f_1UNEMPL_{t-1} + f_2UNEMPL_{t-6} + q_0E_{t-1} + q_1E_{t-2} + E_t$

By creating the Box-Jenkins model with the help of these endogenous and exogenous variables, we can estimate the Bs and hence get the residuals. We run the Ljung Box test on the residuals to eliminate the hypothesis that they are not white noise. Our test results prove that the residuals of our equation are white noise by a significant margin.

Thus our final model is :

$(1-B)UNEMPL_t = 0.1112(1-B)EL92_{t-1} + 0.0021(1-B)INFLL_t - 0.3017(1-B)^2MONSUPL_t - 0.0197(1-B)TRADL_t - 0.0001(1-B)PCI_t + 0.6137UNEMPL_{t-1} + 0.1956UNEMPL_{t-6} - 0.8352E_{t-1} + 0.2735E_{t-2} + E_t$

The slopes for INFLL, MONSUPL, PCI and TRADL are not significant at 5% level(t-values). The numerator for the EL92 variable is significant at 10% level only.

Analysis and Results

This model shows us a lot of important things about the unemployment rates in our country. Let us consider each variable in the equation systematically. I will also talk about dropped variables to further explain and possibly challenge the misnomers we tend to have in the society regarding influence of sudden tragedies like 9/11.

1) Inflation seems to have a positive impact on unemployment rates, which shows that higher inflation rates would cause higher unemployment rates. This basically indicates the phenomenon of "stagflation" tht occurs when AD and AS curves are shifting over time such that there is a greater degree of aggregate supply shock with the aggregate demand not shifting substantially. It also contradicts the Phillips Curve. (Dornbusch, et al, 1998). However, the statistical evidence is not conclusive to prove this as our coefficient is not statistically significant. The relationship shown in our model is that a rise in inflation rate would cause unemployment rate to rise too. Though this does not appear to have a big impact in percentage terms, in real terms it is a lot of people losing their jobs. The cause of this could be that higher costs of production for companies could cause them to lay off workers and/or invest in more durable capital.

2) Money supply M1 has a negative effect on the unemployment rates in the nation. Most literature dealing with Aggregate Demand tends to show that since National Income(Y) increases with increase in M1 supply, it leads to reduction in unemployment rates. Hence our finding is in tune with the general expectations of unemployment behavior. However, it is not significant at even a 10% level. The insignificant t-value that we get for the variable in the model can be a result of double differencing that we imposed on the money supply variable to stationarize it. The finding could also be understood as being a direct result of companies having more money to invest in capital and thereby utilizing more human capital in the economy.

3) Trade balance seems to have a negative impact on unemployment rates as well. Trade balance is defined as the difference between exports and imports. The trend of trade balance has been the widening gaps between these in the past few years. In spite of that,

it did not show up as a significant variable in our analysis. My understanding is that if trade balance increases, it would cause an increased investment in exports, which in turn would increase the demand for human capital and thereby reduce unemployment in the economy. This also fits in with the AD-AS framework that we are using as the basis for even selecting the variables in the analysis.

4) Per Capita Income was also not proved significant in affecting unemployment. However, our results seem to be consistent with the Aggregate Supply Curve which indicates that there is a consistent but lagged relationship between unemployment and National Income (Y). (Dornbusch, et al 1998)

5) Consumer Price Index, which is like a random walk with drift series fails to impact unemployment significantly too. The CPI was considered separately to consider the effect of change in level of prices and thereby inflation . The inflation variable measures the rate of change in price level and thereby rate of inflation in the economy. According to the political business cycle theory, both these variables are separate and affect the outcomes of elections and re-election of incumbents.

6) The most surprising finding of the analysis was that September 11 incident did not seem to affect the unemployment at all. There were no temporary or permanent effects observed. But it is probably too soon to perform this test anyways. Our data is up to February 2003, which is less than 18 months after the event, which could mean skewed and inaccurate results. The graph of unemployment clearly indicates a definite impact seen around years 2000 and 2001, which means that a cumulative effect of elections and September 11 is possible.

7) Of the three elections that were considered, only the election of 1992 seems to have significant and positive effect on unemployment. One piece of information that is missing in our unemployment data is the breakdown of local and foreign nationals in the job market. Election of 1992 was also significant in a political context as it shifted the power from the hands of the Republicans to the Democrats at the central level. Other factors linked with elections like war, recession need to be tested for causality.

8) Election of 1996 was not a significant event in itself. The elections of 2000 seem significant graphically but I was not able to prove anything with the help of the data. It may take a couple more years for the effect to be explicit. Further tests need to be performed using the election month as being November instead of January.

9) Unemployment seems to be affected by itself with a time lag of 1 month and 6 months. This is interesting because every six months or so, our unemployment data seems to be cumulative average of some sort. Another interesting fact to recollect at this time will be that the unemployment data is collected from the unemployment insurance office and their listings. Six months is the time period that a newly unemployed individual receives benefits for. Hence, the significance of this lag can be marginally explained.

Conclusion

As we have observed in the analysis section, it is very difficult to say that our model is perfect or complete in any way. However, we have made some important and interesting observations that could be helpful in further research. Some prediction analysis tests show that our model seems to be reasonably good for short-term extrapolation. There is only white noise in the residuals and the moving average component seems to be well distributed. Thus the conclusion of this analysis is that not all elections effect unemployment rates. 9/11 did not have any impact on unemployment rates in the nation.

Future Scope

There is a wide scope for further research in this area. The biggest addition to this analysis would be to use data for more years. Also, if there was some way to get the changes in the numbers of H-1 visas (foreign nationals allowed to work in the USA) on the basis of tax records, we could get a better idea of the real unemployment rates in the nation and the changes caused by 9/11. Also, inter-variable causality and impacts need to be calculated by using every one of our independent variables by making it endogenous in separate models. A more detailed model using all the economic indicators as exogenous variables may help us get a better idea of the impact of interventions in the economy.

Appendix-I

RATS coding for final model

```
end 1

calendar 1990 3 12

allocate 0 2003:02

open data a:\finals.wk4

data(format=wks,org=obs)

set unempl = log(unemp)

set infll = log(infl)

set unempd = unempl - unempl{1}

set tradl = log(-tradebal)

set el92 = T>=1992:01

set el92t = T==1992:01

set el96 = T>=1996:01

set el96t = T==1996:01

set el00 = T>=2000:01

set el00t = T==2000:01

set sep11 = T>=2001:09

set sep11t = T==2001:09

set cpid = cpi – cpi{1}

set pcid = pci - pci{1}

set tradld = tradl - tradl{1}

set monsupl = log(monsup)

set monsupld = monsupl - monsupl{1}

set monsupdd = monsupld - monsupld{1}

set inflld = infll - infll{1}
```

* BOX-JENKINS INTERVENTION AND TRANSFER FUNCTION MODEL

```
boxjenk(diffs=1,ar=||1,6||,ma=||1,2||,iterations=100,
inputs=4,applydifferences) unempl / unemplt
# el92 0 1 1
# infll 0 0 0
# monsupld 0 0 0
# tradl 0 0 0
# pci 0 0 0
correlate(number=20,qstats,dfc=9,stderrs=autostd) unemplt / unempacf
graph(style=bargraph,key=loright,nodates,max=1.0,min=-1.0) 2
# unempacf
# autostd
```

APPENDIX-II.

Variable	Description
Dependent Variable	
UNEMPL –	Logged Monthly Unemployment Rate
Independent Variables	
INFLL –	Logged Monthly Inflation Rate
TRADL –	Logged Monthly Trade Balance
MONSUPL –	Logged Monthly Money Supply
PCI –	Monthly Per Capita Income
CPI –	Monthly Consumer Price Index
Dummies	
EL92 –	1= all months after Jan'92, 0 = others
EL92t –	1= Jan '92, 0 = others
EL96 –	1= all months after Jan'96, 0 = others
EL96t –	1= Jan'96, 0 = others
EL00 –	1= all months after Jan'00, 0 = others
EL00t –	1= Jan'00, 0 = others
SEP11 –	1= all months after Sep'01, 0 = others
SEP11t –	1= Sep'01, 0 = others

APPENDIX-III.
RATS Modeling Results — Table 2a. First Results

Dependent Variable UNEMPL - Estimation by Box-Jenkins
Iterations Taken   24
Monthly Data From 1990:11 To 2003:02
Usable Observations   148   Degrees of Freedom   135
Centered R**2   0.985546   R Bar **2   0.984261
Uncentered R**2   0.999806   T x R**2   147.971
Mean of Dependent Variable   1.6963136013
Std Error of Dependent Variable   0.1983426971
Standard Error of Estimate   0.0248832201
Sum of Squared Residuals   0.0835885768
Durbin-Watson Statistic   2.020589
Q(36-4)   35.575739
Significance Level of Q   0.30361341

Variable	Coeff	Std Error	T-Stat	Signif
1. AR{1}	0.5914	0.1508	3.92098	0.00013967
2. AR{6}	0.2122	0.0821	2.58312	0.01085517
3. MA{1}	-0.8045	0.1700	-4.73362	0.00000550
4. MA{2}	0.2790	0.0846	3.29757	0.00124671
5. N_EL92{1}	0.0310	0.0175	1.77377	0.07835644
6. D_EL92{1}	0.7239	0.2497	2.89939	0.00436558
7. N_EL00T{1}	-0.0303	0.0222	-1.36893	0.17329355
8. D_EL00T{1}	0.6239	0.6171	1.01095	0.31384810
9. N_INFLL{0}	3.7528e-03	3.2085e-03	1.16964	0.24420494
10. N_PCI{0}	9.1508e-08	1.3984e-07	0.65435	0.51399750
11. N_CPI{0}	-5.8285e-03	5.9281e-03	-0.98319	0.32727077
12. N_MONSUPLD{0}	-0.2665	0.2602	-1.02440	0.30747638
13. N_TRADL{0}	-0.0228	0.0135	-1.68988	0.09335910

Ljung-Box Q-Statistics

Q(20) =   13.2148. Significance Level 0.27952026

Table 2b. Final Results

Dependent Variable UNEMPL - Estimation by Box-Jenkins

Iterations Taken   13

Monthly Data From 1990:11 To 2003:02

Usable Observations   148   Degrees of Freedom   138

Centered R**2   0.985365   R Bar **2   0.984410

Uncentered R**2   0.999804   T x R**2   147.971

Mean of Dependent Variable   1.6963136013

Std Error of Dependent Variable   0.1983426971

Standard Error of Estimate   0.0247646857

Sum of Squared Residuals   0.0846339727

Durbin-Watson Statistic   1.998038

| Variable	Coeff	Std Error	T-Stat	Signif
1. AR{1}	0.613726651	0.153483881	3.99864	0.00010335
2. AR{6}	0.195567952	0.082013877	2.38457	0.01845883
3. MA{1}	-0.835176146	0.171576641	-4.86766	0.00000304
4. MA{2}	0.273490469	0.083849236	3.26169	0.00139556
5. N_EL92{1}	0.032738708	0.017736997	1.84579	0.06706615
6. D_EL92{1}	0.705103543	0.246171379	2.86428	0.00483325
7. N_INFLL{0}	0.002149597	0.003042461	0.70653	0.48104829
8. N_MONSUPLD{0}	-0.301710469	0.256399755	-1.17672	0.24133337
9. N_TRADL{0}	-0.019669545	0.013511069	-1.45581	0.14771645
10. N_PCI{0}	-0.000059515	0.000051833	-1.14820	0.25287268

Ljung-Box Q-Statistics

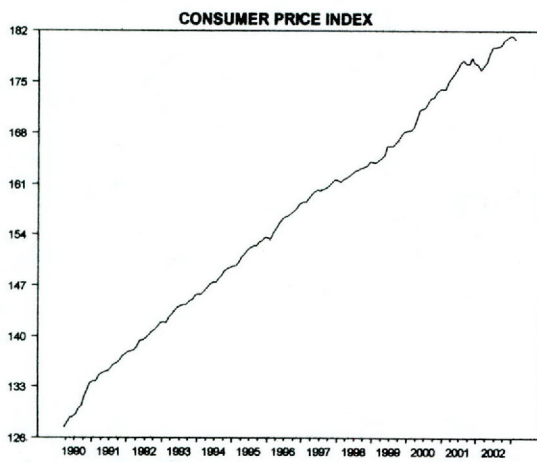Q(20) =   12.7447. Significance Level 0.23829891

APPENDIX-IV.

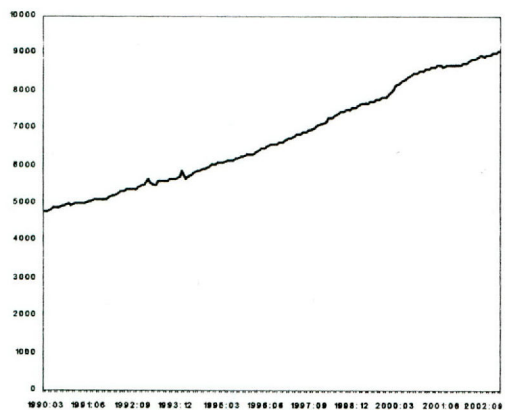## Graph 1 – Time Series Graphs of all Variables
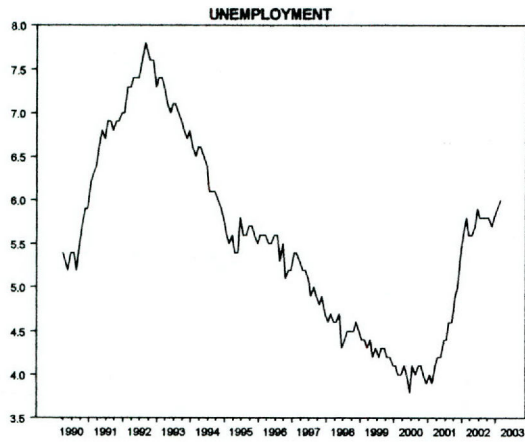
UNEMPLOYMENT

Unemployment
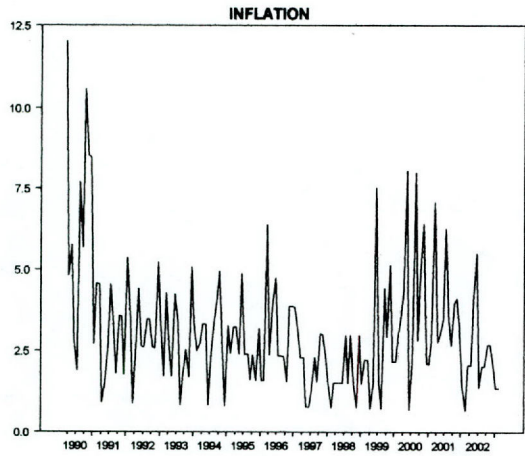
INFLATION

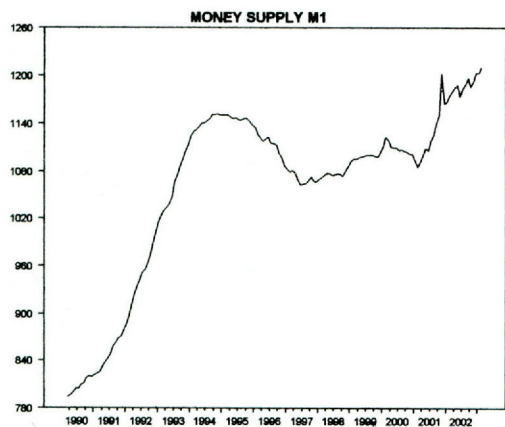Inflation

CONSUMER PRICE INDEX
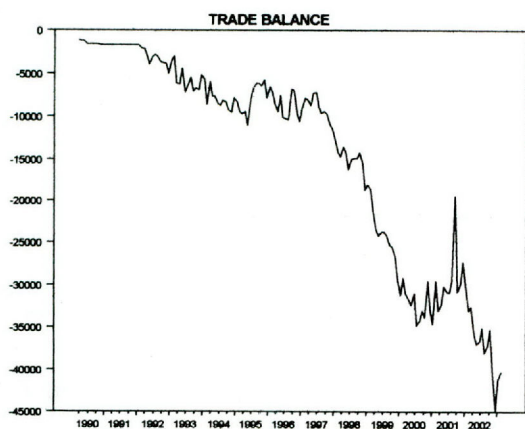
Consumer Price Index

APPENDIX-IV.
Graph 1 – Time Series Graphs of all Variables

Per Capita Income

Money Supply M1

Trade Balance

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Software used : RATS 4.0, EVIEWS, MSEXCEL

<u>www.economagic.com</u>

<u>www.usccensus.org</u>

Handbook for RATS

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