LITHUANIAN REGIONAL FDI DURING THE LITAS PERIOD, 1997-2013

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ABSTRACT

FDI in to the ten counties of Lithuania 1997-2013 is substantial and widely dispersed. Applying a standard model of FDI impact on regional economic growth reveals dispersion of FDI as well as the amount has contributed to stronger regional growth. Results are not sensitive to the uniqueness of greater Vilnius though the county with the national capital continues to attract the most FDI and has suffered least from the demographic crisis. Greater attention to human capital development outside of greater Vilnius is recommended to continue to attract FDI to rural areas of the country with a focus on new goods exports to enhance labour productivity.

Keywords: Lithuania, Local FDI, Regional Analysis.
JEL: F3, P2, P25

INTRODUCTION

The inflow of Foreign Direct Investment (FDI) in to a small transition economy experiencing high emigration is understudied with Lithuania having the most challenging demographic crisis of any country in Europe (IMF, 2015). Once FDI arrives in a transition country it is often concentrated in a few urban areas leading to large inequalities across and within regions. Lithuania is no exception with the three counties with the three major cities having much better labour markets than other counties especially rural areas (OECD, 2018). While regional FDI is examined in the literature, how much FDI flows to urban centres versus rural areas is often ignored. Here we examine rural and urban FDI inside Lithuanian's counties as the economy recovers from the 1998 financial crisis and through the Great Recession some 10 years later using a standard approach to FDI inflows applied to other countries but never Lithuania. Our analysis begins in the late 1990s due to data constraints before 1997 and ends in 2013. The sample period includes joining NATO in 2004 and ends just before the full adaption of the euro in late 2014 (Table 1). By 2014, Lithuania has successfully diversified in to new markets with a competitive economy that is predicted (IMF, 2015) to weather the crisis to the east well.

Lithuania's ten counties vary greatly in size and history. In the interwar period, Vilnius city and county were part of Poland with the capital moved to Kaunas. In the Soviet era, internal and external borders were quite open all around but the economy was distorted toward being a small piece of the overall Soviet economy. Since independence in 1991, external borders are quite open except the most western counties of Klaipeda, Marijampole and Taurage that border the Russian region of Kaliningrad where though the border is open, long delays are required to cross over. The three main cities of Lithuania-Vilnius, Kaunas and Klaipeda-all dominate their particular county's economy with Klaipeda also benefitting from being the main port of the country. FDI positively impacts county growth but only Vilnius County has both above average accumulated FDI stock growth and *per capita* RGCP growth. Data on counties are important

enough to warrant a separate statistical handbook before all data were made available online (Lietuvos Statistikos Departamentas, 2012). Prior cross-county analysis covering 2000-2011 only illustrated how uneven FDI has been across the ten counties, but ignored dispersion within a given county and used a different model (Sakalauskaite and Miskinis, 2014).

Table 1
FOREIGN DIRECT INVESTMENT (FDI) IN LITHUANIAN COUNTIES, 1997-2013

Accumulated Real FDI (millions 2004 Litas)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Lithuania	4439.23	6623.05	8337.07	9311.45	10535.01	13044.57	13645
Avg. Annual Growth %		39.50%	22.90%	11.00%	12.30%	21.30%	4.50%
County (apskritis)							
Alytus apskritis	117.98	177.6	217.62	222.11	147.44	141.76	191.88
Kaunas apskritis	678.23	820.42	1070.63	1231.69	1314.43	1579.69	1871.59
Klaipeda apskritis	765	880.51	1065.79	1164.77	1298.48	1367.35	1565.97
Marijampole apskritis	19.06	21.54	21.42	27.15	61.48	73.89	79.04
Panevezys apskritis	246.7	346.46	393.02	387.99	454.46	461.64	686.64
Siauliai apskritis	123.27	152.57	147.67	157.84	166.3	179.82	189.45
Taurage apskritis	13.7	18.29	25.47	21.97	19.56	14.66	22.87
Telsiai apskritis	130.2	119.14	170.51	87.46	17.15	557.92	777.11
Utena apskritis	7.28	94.4	97.79	111.16	205.62	336.64	254.72
Vilnius apskritis	2337.81	3992.13	5127.14	5899.31	6850.09	8331.19	8005.73
	2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Lithuania	15968.1	23025.07	26787.66	30919	23911.98	22409.44	24013.54
Avg. Annual Growth %	15.70%	36.20%	15.10%	14.30%	-25.60%	-6.50%	6.90%
County (apskritis)							
Alytus apskritis	170.6	386.29	390.5	391.51	287.53	251.01	227.19
Kaunas apskritis	1886.9	2517.3	2298.63	3450.25	2452.57	2914.91	2891.63
Klaipeda apskritis	1743.3	2103.16	2020.36	2540.84	2506.4	2246.63	2369.19
Marijampole apskritis	112	98.18	92.01	81.57	106.12	231.54	234.62
Panevezys apskritis	728.3	665.73	488.69	517.29	439.79	552.18	433.07
Siauliai apskritis	193.7	269.41	362.79	381.66	376.96	352.76	394.4
Taurage apskritis	21.5	26.3	30.33	55.82	43.76	34.52	31.77
Telsiai apskritis	1171.6	3725.84	5912.24	5166.94	1161.57	1901.93	2525.56
Utena apskritis	218.4	259.47	224.36	289.98	261.69	253.76	246.65
Vilnius apskritis	9721.8	12973.39	14967.76	18043.15	16275.58	13670.19	14659.45
	2012	**2013**	**2004-2013**				
Lithuania	26060.57	26846.35					
Avg. Annual Growth %	5.00%	3.00%					

County (apskritis)							
Alytus apskritis	243.07	244.58	69.83%				
Kaunas apskritis	3302.85	2800.52	122.01%				
Klaipeda apskritis	2282.18	2090.41	92.83%				
Marijampole apskritis	297.66	259.78	172.65%				
Panevezys apskritis	531.72	623.79	86.64%				
Siauliai apskritis	383.35	394.62	104.79%				
Taurage apskritis	30.2	36.26	90.30%				
Telsiai apskritis	2290.27	2114.41	176.80%				
Utena apskritis	186.78	161.07	182.70%				
Vilnius apskritis	16512.49	18120.9	154.29%				

There has been great variation in FDI inflows. Starting from a low $30 million in the early 1990s, FDI increased steadily up to $925 million in 1998 but then was cut by 50% thanks to the Russian financial crisis at the end of that year. By the last year before NATO accession (2003) FDI was little more than the 1996 level. Joining NATO in 2004 strongly increased FDI to new highs with approximately $2 billion in FDI for each year 2006-2008 which some have characterized as excessive dependence (Jimborean and Kelber, 2017). However, the global crisis reduced 2009 to a level ($17 million) not seen since 1992 followed by a moderate recovery to $708 million in 2013. From 2007-2013 FDI has been found to enhance both GDP and export growth in both the short run period 2007-2013 (Gaspareniene and Remeikene, 2015) and over the entire transition period (Jimborean and Kelber, 2017). Unfortunately the crisis in nearby Ukraine now makes it unlikely FDI will return to the $2 billion level before the Great Recession.

County (Apskritys) Descriptive Statistics

Like the country overall, each county experienced strong real GCP growth over the entire Sample period with slightly slower growth after 2004 (Table 2). The demographic crisis then raised the *per capita* RGCP rates even higher overall and in the two shorter periods as well. Therefore population cannot be used as a proxy for economic output as is often done in the FDI literature. The severe demographic crisis warrants a more detailed description (Table 2). The population shares of counties are remarkably constant except for Vilnius County which increased from 24% to 27% of the inter-county share over the 17 year period. From 1996-2003 counties lost an average of 5% of their population with Utena losing the most (8.5%). Over the long run (1996-2013) counties lost 19.3% of their population with Utena again losing the most (30.9%). Only Klaipeda and Vilnius were below the long run average population loss with Vilnius losing only 7% which is an outlier. Therefore though all counties lost population, Vilnius alone gained a greater share of the smaller total. Lithuania is a classic case where a demographic crisis creates the appearance of a rising standard of living as measured by *per capita* GDP when actually the severe loss of population could lower the standard of living. Though growth is strong overall and recovered quickly after the Great Recession, the annual and persistent loss of 1% of the population during the 21st century (OECD, 2018) haunts any positive prognosis for future Lithuanian economic success.

Table 2
GCP, POPULATION, FDI GROWTH RATES COMPARISON

	RGCP growth	pcRGCP Growth	Pop. Growth	RFDI Stock Growth	Human Capital
	1997-2003				
LITHUANIA	11.20%	11.90%	-5.00%	101.80%	20.50%
Alytus	9.40%	10.30%	-6.00%	47.70%	14.20%
Kaunas	12.00%	12.70%	-5.30%	93.60%	23.70%
Klaipeda	11.80%	12.50%	-4.40%	68.70%	20.70%
Marijampole	9.20%	9.90%	-4.70%	122.30%	13.30%
Panevezys	9.00%	9.90%	-6.70%	94.30%	15.60%
Siauliai	8.80%	9.80%	-6.90%	42.30%	16.80%
Taurage	8.60%	9.30%	-4.80%	50.10%	13.70%
Telsiai	12.00%	12.60%	-4.20%	142.60%	12.10%
Utena	9.30%	10.50%	-8.50%	188.90%	17.50%
Vilnius	15.20%	15.60%	-2.90%	109.60%	27.00%
	RGCP growth	**pcRGCP Growth**	**Pop. Growth**	**RFDI Stock Growth**	**Human Capital**
	1997-2013				
LITHUANIA	8.90%	10.10%	-19.33%	143.24%	26.60%
Alytus	7.20%	8.80%	-25.71%	69.83%	18.80%
Kaunas	9.40%	10.60%	-20.18%	122.01%	30.60%
Klaipeda	9.20%	10.30%	-17.97%	92.83%	26.20%
Marijampole	7.60%	8.90%	-22.35%	172.65%	16.00%
Panevezys	7.00%	8.50%	-26.00%	86.64%	20.40%
Siauliai	7.50%	9.20%	-29.12%	104.79%	20.90%
Taurage	7.80%	9.30%	-26.52%	90.30%	16.10%
Telsiai	8.50%	9.90%	-22.66%	176.80%	16.60%
Utena	6.20%	8.00%	-30.85%	182.70%	22.30%
Vilnius	11.20%	11.60%	-7.20%	154.29%	35.50%
	RGCP growth	**pcRGCP Growth**	**Pop. Growth**	**RFDI Stock Growth**	**Human Capital**
	2004-2013				
LITHUANIA	7.40%	8.80%	-13.10%	50.80%	30.30%
Alytus	5.70%	7.70%	-18.10%	35.60%	21.50%
Kaunas	7.60%	9.10%	-13.50%	39.00%	34.70%
Klaipeda	7.40%	8.80%	-12.40%	18.10%	29.40%
Marijampole	6.40%	8.20%	-16.30%	79.50%	17.70%
Panevezys	5.60%	7.60%	-17.60%	-15.50%	23.20%
Siauliai	6.60%	8.80%	-20.50%	68.30%	23.30%
Taurage	7.20%	9.30%	-19.90%	51.10%	17.50%
Telsiai	6.10%	7.90%	-17.00%	57.40%	19.30%
Utena	4.10%	6.30%	-20.60%	-30.20%	25.20%
Vilnius	8.40%	8.90%	-3.90%	60.30%	40.60%

Real FDI in to Lithuania's regions began in earnest after independence was achieved in 1992 through 1995 is the first year Lithuania can be considered to be an open economy (Cho and Diaz, 2018) with the earliest FDI across regions discussed in Brock & Urbanavicius (2008). Marijampole, Telsai, Utena and Vilnius counties had above average (102%) FDI stock increases through 2003 (Table 2) and remained the lead counties over the long run. The pattern of high FDI growth indicates both relatively rural and urban counties benefitted from FDI instead of a bias toward urban areas often found in other transition economies. Relatively rural Utena, Telsiai and Marijampole have above average FDI growth while Kaunas and Klaipeda have above average RGCP growth showing a mix of economic and FDI growth across regions. Such growth is especially important to try and employ rural workers who suffer the most from lack of jobs and mobility (OECD, 2018). At the sub-county level, both the stock and flow of domestic and foreign direct investment are available across 60 units giving a complete panel of 960 observations. We use these limited data to construct the annual coefficient of variation to analyse dispersion of FDI in to rural areas.

THE METHOD AND DATA

The cross-county level sample data include data available only at the county aggregate level previously analysed for an earlier era (Brock and Urbanavicius, 2008) and sub-county data that have not been used in econometric analysis of Lithuania's FDI experience. We therefore analyse the regional economy just above the firm level which has been analysed for both the late socialist (no FDI) and early transition (little FDI) eras (Brock, 1995; Javorcik, 2004) with the latter study finding FDI had spill overs only when joint ventures were involved. While we do not look at vertical or horizontal FDI as others have done in Eastern Europe (Estrin and Uvalic, 2016), we add to the literature by looking at intra-regional dispersion explicitly.

We apply the method of Feder (1983) and Levin and Raut (1997) that has been previously applied to China's (Zhang, 2001) and Russia's regions (Brock, 2005). The approach assumes the Lithuanian economy has an FDI sector in addition to the domestic economy with the FDI sector creating an externality effect and is a more specific model within a more general literature measuring the impact of FDI on GDP growth (Jimborean and Kelber, 2017). Solow's residual total factor productivity "*A*" coefficient is explicitly influenced by an inflow of FDI. The resulting equation that might be characterized as a modified aggregate production function is:

$$gY=a+t+b(gL)+c(I/Y)+d(FDI/Y)+e\{del(Fstock/Y)\}+f(initial)+h(HK)+i\{HK*del(Fstock/Y)\}+j(Xshare)+k(CV)+u$$

All variables have subscripts "*i*" and "*t*" representing county and year which have been suppressed. gY is the percentage growth rate of a region's real GRP, gL is the percentage growth rate of a region's labour force, I is the real flow of domestic investment into a region in a given year, FDI is the same as I but real foreign direct investment only, Fstock is the cumulative amount of FDI in a region since 1991 with '*del*' indicating the percentage change in the ratio (Fstock/GRP) relative to the prior year, '*initial*' is the initial development level of a region defined as the 1997 log *per capita* GRP, and HK is the percentage of the population ages 25-64 that has high educational attainment according to a Eurostat standard (ISCED 5,6). "*Xshare*" is the ratio of a county's exports to GRP in a given year with the issue of what kind of exports matter most left to other studies (Cho and Diaz, 2018). "*CV*" is the annual coefficient of variation

of FDI across all 60 sub-county administrative units in Lithuania which include towns and rural areas. While the ratio of rural to urban FDI within a region in a given year was considered as another regressor, the high and negative correlation with both HK and "*initial*" regressors led to the variable being dropped to avoid multicollinearity. The coefficient "a" allows for regional fixed effects which is superior to random effects given we have the entire population of regions. "*t*" is a trend term interpreted as capturing residual technological progress which is expected to be statistically insignificant as Lithuania exhibits poor innovation performance even after the Great Recession (IMF, 2015). The coefficients "*b–f, h-k*" are to be estimated; '*u*' is a standard error term. The equation is estimated for the years 1998-2013 across all regions plus two shorter periods 1998-2003 and 2004-2013 to examine any structural changes following NATO accession and a more secure environment for FDI. As a sensitivity test, the equation is also rerun without Vilnius county which is unique historically, contains the capital, and has a much larger share of FDI and the population compared to any other area. Because of the limited sample and the desire to look at relatively short sub-sample periods, we do not lag right hand side variables as is often done (Jimborean and Kelber, 2017) in general and for Lithuania in particular (Kuliaviene and Solnyskiniene, 2014). We assume the inflation level and variation are uniform within the country and do not include an explicit price control which is an advantage of staying inside a single country.

Following Zhang (2001), "*b-d*" are expected to be positive as they represent the standard marginal products of labour and capital to output growth. "*e*" reflects assumed superior productivity of firms with foreign investment and is expected to be positive. "*f*" is expected to be negative as convergence would allow relatively poor counties to catch up to relatively rich ones. "*h-i*" is expected to be positive as more HK would grow output directly and indirectly provide an absorbing base for more FDI enhancing growth. Simple correlation analysis revealed "*del (Fstock/Y)*" and "*HK*del(Fstock/Y)*" to be highly correlated (0.95) so we dropped the latter variable and did not estimate "*i*'. Finally, "*j-k*" which was not used by Zhang (2001) are hypothesized to both be positive as a greater export orientation would improve economic performance while higher variation in FDI outside urban centres would represent FDI deepening across counties with the net effect of positive exposure to foreign technology and management enhancing regional output growth.

RESULTS

Looking at the results for all 10 counties and both sub-periods (Table 3), the trend term representing technological progress is statistically insignificant except in the early period suggesting a strong shift outward of production possibilities as the economy transitioned from the Soviet period that did not continue after 2004. While labour growth and domestic investment enhance growth over the long run, the level of FDI is statistically insignificant. However, in both the shorter periods, the level is statistically significant and positive as expected. Exploring the impact of FDI further, the coefficient of "*e*" is unexpectedly negative in any period indicating that firms that have received FDI are not more productive than other firms supporting Westmore's (2016) finding that firms are having difficulties absorbing foreign experience. While the sign on "*f*" changes it is never significant so there is little evidence of convergence or divergence across counties. Human capital's statistically significant impact on growth post-NATO but not before suggests Lithuania is improving the quality of the diminishing labour force to spur growth despite the large emigration. Regions with export orientation has no impact on growth in any period. Finally, the reversal of sign and statistical significance of the coefficient of

variation regressor illustrates that deepening the spread of FDI within regions enhances regional growth favoring policies of trying to attract more FDI to rural areas.

Table 3
CROSS-COUNTY REGRESSION RESULTS

A. 1998-2013 (n=160)	**Coeff**	**S.error**	**T-stat.**
FE	0.00083	0.00173	0.48
Trend	-0.00012	0.00015	-0.83
gLabor	0.15029***	0.03126	4.81
I/Y	0.23431***	0.07957	2.94
FDI/Y	0.06713	0.04092	1.64
DelFY	-0.05963***	0.02189	-2.72
Log (initial)	0.02228	0.03297	0.68
HK	-0.04862	0.07222	-0.67
Xshare	-0.00342	0.00679	-0.5
CoeffVar	0.03314***	0.01149	2.88
Adj. R-sq.	0.215		
B. 1997-2003 (n=60)	Coeff	S.error	T-stat.
FE	0.0008	0.00181	0.44
Trend	0.00066***	0.00023	2.87
gLabor	0.01593	0.04096	0.39
I/Y	0.14958	0.09488	1.58
FDI/Y	0.43234*	0.23915	1.81
DelFY	-0.04521*	0.02413	-1.87
Log (initial)	-0.04494	0.04158	-1.08
HK	0.22434	0.13881	1.62
Xshare	0.00363	0.01312	0.28
CoeffVar	-0.43434***	0.09132	-4.76
Adj. R-sq.	0.476		
C. 2004-2013 (n=100)	Coeff	S.error	T-stat.
FE	-0.00174	0.00219	-0.79
Trend	0.00028	0.00021	1.39
gLabor	-0.42508***	0.15663	-2.71
I/Y	0.32240***	0.10074	3.2
FDI/Y	0.21980***	0.06028	3.65
DelFY	-0.16349***	0.03811	-4.29
Log (initial)	-0.07952	0.0483	-1.65
HK	0.25361**	0.11627	2.18
Xshare	0.00078	0.0062	0.13
CoeffVar	0.03712***	0.01271	2.92
Adj. R-sq.	0.397		

Note: ***=1%, **=5%, *=10%

As a sensitivity test, all regressions were rerun without Vilnius county thus eliminating the capital from the analysis (Table 4). Most of the conclusions are unchanged with two exceptions. First, the statistically significant and positive impact of FDI but not domestic investment in the early period is now reversed with domestic investment positive and significant but FDI not. Vilnius dominates the FDI impact pre-NATO but, adding to the spreading out of FDI story, not post-NATO. FDI impact is spreading out to other counties in the aggregate as well as within each county. Second, the level of human capital keeps a positive sign, but is now not statistically significant. The growth enhancing improvement in labour quality is biased to Vilnius county with the Flagship University and stronger secondary school institutions suggesting the need for greater human capital investment outside of the Vilnius area.

Table 4
CROSS-COUNTY (EXCEPT VILNIUS) REGRESSION RESULTS

A. 1998-2013 (n=144)	**Coeff**	**S.error**	**T-stat.**
FE	-0.00074	0.00227	-0.33
Trend	-4.33E-05	0.00015	-0.28
gLabor	0.14408***	0.03168	4.55
I/Y	0.20155**	0.08329	2.42
FDI/Y	0.04351	0.03924	1.11
DelFY	-0.05651**	0.02214	-2.55
Log (initial)	0.00554	0.03328	0.17
HK	-0.06039	0.08573	-0.7
Xshare	-0.00025	0.00691	-0.04
CoeffVar	0.03425***	0.01211	2.83
Adj. R-sq.	0.2		
B. 1997-2003 (n=54)	**Coeff**	**S.error**	**T-stat.**
FE	0.00128	0.0022	0.58
Trend	0.00056**	0.00023	2.43
gLabor	0.03242	0.04269	0.76
I/Y	0.20743*	0.1193	1.74
FDI/Y	0.38215	0.29088	1.31
DelFY	-0.04351	0.02857	-1.52
Log (initial)	-0.03875	0.0412	-0.94
HK	0.21344	0.16037	1.33
Xshare	0.00113	0.01526	0.07
CoeffVar	-0.37399***	0.09851	-3.8
Adj. R-sq.	0.394		
C. 2004-2013 (n=90)	**Coeff**	**S.error**	**T-stat.**
FE	-0.00218	0.0031	-0.71
Trend	0.00029	0.00021	1.38
gLabor	-0.40427**	0.16267	-2.49
I/Y	0.29336***	0.10728	2.73

FDI/Y	0.20167***	0.05829	3.46
DelFY	-0.15812***	0.03829	-4.13
Log (initial)	-0.07821	0.0489	-1.6
HK	0.22836	0.14679	1.56
Xshare	0.00143	0.00663	0.22
CoeffVar	0.03554***	0.0133	2.67
Adj. R-sq.	0.372		
Note: ***=1%, **=5%, *=10%			

CONCLUSIONS

FDI in to Lithuania has enhanced growth both directly and indirectly through dispersion in to rural areas. Though counties appear to not be converging in the standard understanding of the term, substantial FDI has been received in relatively rural areas. Lithuania must improve the quality of the diminishing labour force to continue to benefit from FDI with little support here for the idea that firms already with FDI are more productive. Though an aggregate export orientation of a region does not enhance growth unlike other countries, Cho and Diaz (2018) show Lithuania like the two other Baltic countries has excelled at new goods exports regardless of origin region. Therefore one regional policy to enhance the continued challenge of increasing labour productivity (Westmore, 2016) is to focus on attracting FDI to enhance new goods exports. This is also a topic for further research at the regional and sub-regional level. The results here provide a baseline to measure current and future Lithuanian performance with the new euro currency providing stability offset by the instability of Russian sanctions and a frozen war in eastern Ukraine. Recent availability of satellite data allows better tracking of economic development with some evidence that Eastern Europe including Lithuania is quite different from other areas of the world (Elvidge et al., 2017).

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