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Gender inclusion and energy poverty in Africa: a note

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Abstract

We show the asymmetric behaviour of energy poverty in Africa to positive and negative shocks in female economic empowerment. One policy conclusion of the finding is that energy poverty is anti-sticky in Africa. Thus, energy poverty typically rises to a greater extent for concurrent decrease in female labour force participation rate than it falls for concurrent increase. Energy policy should prioritize gender economic inclusion.

Keywords: Africa; energy poverty; female economic participation

1. Introduction

Energy poverty is a major issue in Sub-Saharan Africa (Szabó et al., 2013). Despite longstanding efforts to combat energy poverty, 633 million people did not have access to electricity in 2014, and 792 million people relied on traditional biomass as their major energy source for cooking (Avila et al., 2017). According to current trends, the number of energy-insecure individuals in Sub-Saharan Africa is predicted to reach 823 million by 2030 (Avila et al., 2017). As a result, it is vital that policymakers in Sub-Saharan Africa have a thorough understanding of the critical policy initiatives that contribute to and solve energy poverty in the region. A growing number of studies contribute to this strand of the literature on Africa's energy poverty by relying in micro-level dataset (Koomson & Churchill, 2022; Koomson & Danquah, 2021) with very little understanding of the dynamics of energy poverty at the macro level. We add to the expanding body of work on policy measures aimed at addressing energy poverty at the macro level by investigating the asymmetric effect of female economic participation (FLFP) on energy poverty in Sub-Saharan Africa.

Consistent with sustainable development literature, there are two theoretical positions that support the asymmetric effect of FLFP in development outcomes, namely: *(i)* the non-linear nexus between gender economic inclusion and macroeconomic outcomes and *(ii)* the position that improving positive macroeconomic signals can lead to negative outcomes on other macroeconomic outcomes. The first strand of the literature argues that FLFP has a U-shaped effect on economic growth (Tam, 2011; Tsani et al., 2013). Given that economic growth is important for the use of electricity (Burke & Dundas, 2015), increased FLFP is likely to lead to energy poverty through the economic growth channel. Second, improved household income by means of increased FLFP leads to increased house prices (Johnson, 2014; Salari & Javid, 2019). We argue that all else equal, higher prices for houses may lead to reduced access to electricity as the higher end homes which may need greater electricity would become expensive to purchase. Although, the two theoretical positions have been well documented in the literature, this study tests whether the effect is either symmetric or asymmetric.

Our empirical plan is as follows. First, we separate the effect of positive and negative changes in FLFP. Second, we computed the long run asymmetric coefficients based on the Shin et al. (2014). Third, we make use of energy poverty measure (i.e., access to electricity) that accurately reflect the living and economic realities in sub-Saharan Africa. This is because Sub-Saharan Africa has the greatest number of countries with the lowest rate of electrification (Avila et al., 2017). We note that positive and negative changes have different impacts on energy poverty and that, the positive effect dominates the negative effect.

The contributions of the study are as follows. First, we contribute to studies assessing the economic consequences of FLFP in Africa (Agu & Aguegboh, 2021; Asongu et al., 2021) by presenting the asymmetric behaviour of energy poverty to positive and negative changes in FLFP rate. Second, by splitting the female economic empowerment effect into positive and negative changes, we also contribute to methodological studies by highlighting the importance of asymmetric modelling to draw the correct inferences and at best, making correct policy decisions aimed at addressing energy poverty (Koomson & Danquah, 2021).

2. Data and Methods

2.1 Data

We make use of the 2021 edition of the *World Development Indicators* database for 50 sub-Saharan African countries for the period 2004 to 2018. We follow extant literature and energy poverty as lack of access to electricity, which we operationalized as the inverse of access to electricity. This approach assesses energy poverty accurately and reflects the living and economic realities in developing economies (Churchill & Smyth, 2020; Koomson & Churchill, 2022). Additionally, the literature provides broad and well-established economic factors influencing energy poverty.

2.2 Methods and model specification

In this paper, we use panel data techniques. We begin with the pooled OLS estimation with an effective statistical inference from the Driscoll-Kraay (D-K), White, Rogers and Newey-West (N-W) robust standard errors approaches that produce heteroskedasticity and autocorrelation-consistent standard errors. Second, we applied the fixed effect instrumental variable estimator. For robustness, we applied a panel quantile regression estimation as described by Canay (2011) as well as system GMM estimation methodologies by Arellano and Bond (1991) two-step and Blundell and Bond (1998) two-step estimators. The baseline fixed effect model is summarized in the equation below.

$$\Delta ln\mathrm{EGP}_{i,t} = \delta_0 + \delta_1 \Delta ln\mathrm{FLFP}_{i,t} + \delta_2 \mathrm{DEC} \times \Delta ln\mathrm{FLFP}_{i,t} + \sum_{k=1}^{2} \sigma_k X_{h,i,t} + \eta_i + \zeta_t + \varepsilon_{i,t} \qquad (1)$$

where $\Delta ln\mathrm{EGP}_{i,t}$ is the percentage change in energy poverty in country i from year t to year $t-1$. δ_0 is a constant term. $\Delta ln\mathrm{FLFP}_{i,t}$ is the percentage change on FLFP rate in country i from year t to year $t-1$. DEC is a dummy variable what takes the value of 1 of FLFP decrease in the current year and 0 otherwise. *X* is a vector of control variables identified in the extant literature to affect energy poverty (i.e., foreign direct investment (FDI), urban population (URB), unemployment rate (UEM), and life expectancy at birth (LIFEEXP)). $\tau$is the coefficient of auto-regression, which is one a year lag is enough to capture past information. ζ_t is the time-specific constant, η_i is the country-specific effect and $\varepsilon_{i,t}$ is the error term.

2.3 System GMM Estimation

There are five main reasons for the use of the generalized method of moments (GMM) estimation technique First, there are more cross-sections than years in our sample. Second, we note that the energy poverty indicator included in the study is persistent since the correlation between the value in level and its initial lags is higher than the rule of thumb level of 0.800. Third, the GMM technique adjusts for cross-country variability in estimate since it uses panel data. Fourth, system estimators address difference estimator biases. Fifth, the estimator is endogeneity-sensitive because it accounts for simultaneity and unobserved heterogeneity. When compared to the difference estimator, the system GMM estimator developed by Arellano and Bond (1991) and Blundell and Bond (1998) performs more efficiently. Roodman (2009a, 2009b) extends Arellano and Bover (1995) to limit instrument proliferation that can skew estimations. Therefore, the improved estimate method uses forward orthogonal differences. We choose a two-stage method due to its ability to account for heteroscedasticity. The following equations summarize the conventional system GMM estimate approach. The following equations summarize the conventional system GMM estimate approach.

$$\Delta ln\mathrm{EGP}_{i,t} = \delta_0 + \delta_1 \Delta ln\mathrm{EGP}_{i,t-\tau} + \delta_2 \Delta ln\mathrm{FLFP}_{i,t} + \delta_3 \mathrm{DEC} \times \Delta ln\mathrm{FLFP}_{i,t} + \sum_{k=1}^{2} \sigma_k X_{h,i,t-\tau} + \eta_i + \zeta_t + \varepsilon_{i,t}$$

$$\begin{aligned}\Delta ln\mathrm{EGP}_{i,t} - \Delta ln\mathrm{EGP}_{i,t-\tau} &= \delta_1\big(\Delta ln\mathrm{EGP}_{i,t-\tau} - \Delta ln\mathrm{EGP}_{i,t-2\tau}\big) + \delta_2(\Delta ln\mathrm{FLFP}_{i,t} - \Delta ln\mathrm{FLFP}_{i,t-\tau}) + \delta_3(\mathrm{DEC} \times \Delta ln\mathrm{FLFP}_{i,t} \\ &\quad - \mathrm{DEC} \times \Delta ln\mathrm{FLFP}_{i,t-\tau}) + \sum_{k=1}^{2} \sigma_k \,(X_{h,i,t-\tau} - X_{h,i,t-2\tau}) + (\zeta_t - \zeta_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau})\end{aligned}$$

where $\Delta ln\mathrm{EGP}_{i,t}$ is the percentage change in energy poverty in country i from year t to year $t-1.\delta_0$ is a constant term.$\Delta ln\mathrm{FLFP}_{i,t}$ is the percentage change on female economic participation in country i from year t to year $t-1$. $DEC$is a dummy variable what takes the value of 1 of female economic participation decrease in the current year and 0 otherwise. X is a vector of control variables identified in the extant literature to affect energy poverty (i.e., foreign direct investment, urban population, unemployment rate, and life expectancy at birth). τ is the auto-regression coefficient, which suggests a one-year lag is appropriate to account for past information contained in the data. ζ_t is the time invariant constant, η_i is the country fixed effect and $\varepsilon_{i,t}$ is the error term.

2.4 The Canay (2011) Model

We can present the Canay (2011) model as follows:

$$Y_{it} = X'_{it}\beta(\tau) + \alpha_{it} + \varepsilon_{it\tau} \qquad (1)$$

where

$$\varepsilon_{it\tau} = X'_{it}(\beta(U_{it}) - \beta(\tau) \qquad (2)$$

$$\varepsilon_{it\tau} = X'_{it}(\beta(U_{it}) - \beta(\tau) \quad . \qquad (3)$$

Then

$$Y_{it} = X'_{it}\beta(U_{it}) + \alpha_i \qquad (4)$$

where i denotes country and t denotes year. (Y_{it}) is a visible explained variable (in our case, energy poverty), (X_{it}) is a vector of noticeable independent variable (foreign direct investment, urban population, unemployment rate, and life expectancy at birth. X_{it} is a vector assumed to include a constant term, (U_{it}, α_i) are unobservable, $U_{it} \sim U[1,0]$. β represents unknown parameter, and the function $\tau \mapsto X'\beta(\tau)$ is considered to grow exponentially in $\tau\, \varepsilon\, (0.1)$, with the parameter vector of interest being $\beta(t)$.

3. Empirical results

We present the results of the pooled OLS, the GMM and the fixed effects model in Tables 1, 2 and 3. In employing the pooled estimation, we have used the D-K, White, Rogers, N–W and OLS standard errors methods. In conducting the GMM estimation, we have used the Arellano-Bond two-step and Blundell-Bond two-step estimators. Table 1 to 3 present the results of the fixed effects and GMM analyses of the relationship between FLFP and energy poverty in Africa.

[Insert Tables 1-3 about here]

From Table 1, the results support evidence of an asymmetric relationship between FLFP and energy poverty in the pooled estimation, and this is true across four of the standard error approaches. The estimated coefficients of $\Delta lnFLFP$ and $DEC\times \Delta lnFLFP$ have a positive and negative impact respectively at a 1% level of significance, except for the pooled OLS estimator. However, the results of the fixed effects estimation provide no evidence of an asymmetric relationship between them. Using the GMM analysis, the findings do support the presence of an asymmetric relationship between FLFP and energy poverty.[1] Next, we controlled for FDI and urbanization, and present the results in Table 2 while Table 3 reports results for when we control for unemployment and life expectancy. The findings of the pooled estimations conducted with the D-K, Rogers and N-W approaches reveal the effect of FLFP on energy poverty is asymmetric. Moreover, the results of the GMM estimators are consistent with the results in Table 1, except in Table 3, there is evidence of an asymmetric relationship between FLFP and energy poverty.

[Insert Tables 4-6 about here]

Tables 4-6 report the regression results based on Canay (2011) fixed effect quantile panel data model. Based on the results, we find an asymmetric effect of FLFP on energy poverty, and this only true for the 90th quantile in Table 5. Regarding control variables, urbanization and unemployment show consistent positive relationship with notable differences across quantiles. The effect of FDI and life expectancy is negative.

4. Discussion and policy implications

We show the asymmetric behaviour of energy poverty in Africa to positive and negative shocks in FLFP, consistent with our theoretical position. Based on the GMM analysis, we compute the long run asymmetric coefficients for positive and negative changes in FLFP to be

[1] Tables 1-3 comprise of three sets of specifications related to the control of different sets of variables identified in the extant literature to affect energy poverty which we are not able to include all in one model because of the possible problem of multicollinearity. Four information criteria are used to validate the estimated models. The models are overwhelmingly valid with insignificant Hansen test statistics. Hansen test is a more robust test than the Sargan test; however, instrument proliferation weakens the Hansen test, unlike the Sargan test. Adopting the Hansen test and ensuring that the number of cross-sections in every specification is larger than the number of instruments can help address these conflicting criteria.

2.255 and -1.270, respectively.[2] Meanwhile, the results from Canay (2011) model reveal that positive changes in FLFP rate is significantly associated with reduced levels of energy poverty while negative shocks in FLFP is positively related with energy poverty at relatively extreme energy poverty levels. This finding is consistent with the importance of prioritizing gender in energy policy aimed at extreme poverty eradication and inequality (Ngarava et al., 2022). Energy poverty is anti-sticky in Africa; thus, energy poverty typically rises to a lesser extent for concurrent increase in FLFP than it falls for concurrent FLFP decrease. Our results also show that the positive effect of urbanization and unemployment on energy poverty decreases as energy poverty increases. However, with an increase in FDI and life expectancy, energy poverty decreases. Notably, the negative effect of life expectancy on energy poverty increases as energy poverty increases.

[2] The long run asymmetric coefficient for positive and negative changes in FLFP is computed as $\frac{(-(0.6225)}{-0.2761}$ and $\frac{(-(-0.3506)}{-0.2761}$. In the computation, 0.6225 and -0.3506 are the coefficients of positive and negative changes in FLFP while -0.2761 is the coefficient of ΔlnEGP (t-1) from Table 1.

References

Agu, C. V., & Aguegboh, E. S. (2021). Inequality and economic development: a test of the feminization hypothesis in selected African countries. *Gender, Technology and Development*, *25*(3), 331-353.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The review of economic studies*, *58*(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29-51.

Asongu, S. A., Adegboye, A., & Nnanna, J. (2021). Promoting female economic inclusion for tax performance in Sub-Saharan Africa. *Economic Analysis and Policy*, *69*, 159-170.

Avila, N., Carvallo, J. P., Shaw, B., & Kammen, D. M. (2017). The energy challenge in sub-Saharan Africa: A guide for advocates and policy makers. *Generating Energy for Sustainable and Equitable Development, Part*, *1*, 1-79.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115-143.

Burke, P. J., & Dundas, G. (2015). Female labor force participation and household dependence on biomass energy: evidence from national longitudinal data. *World Development*, *67*, 424-437.

Canay, I. A. (2011). A simple approach to quantile regression for panel data. *The econometrics journal*, *14*(3), 368-386.

Churchill, S. A., & Smyth, R. (2020). Ethnic diversity, energy poverty and the mediating role of trust: Evidence from household panel data for Australia. *Energy Economics*, *86*, 104663.

Johnson, W. R. (2014). House prices and female labor force participation. *Journal of Urban Economics*, *82*, 1-11.

Koomson, I., & Churchill, S. A. (2022). Employment precarity and energy poverty in post-apartheid South Africa: Exploring the racial and ethnic dimensions. *Energy Economics*, *110*, 106026.

Koomson, I., & Danquah, M. (2021). Financial inclusion and energy poverty: Empirical evidence from Ghana. *Energy Economics*, *94*, 105085.

Ngarava, S., Zhou, L., Ningi, T., Chari, M. M., & Mdiya, L. (2022). Gender and ethnic disparities in energy poverty: The case of South Africa. *Energy Policy*, *161*, 112755.

Roodman, D. (2009a). How to do xtabond2: An introduction to difference and system GMM in Stata. *The stata journal*, 9(1), 86-136.

Roodman, D. (2009b). A note on the theme of too many instruments. *Oxford Bulletin of Economics and statistics*, *71*(1), 135-158.

Salari, M., & Javid, R. J. (2019). How does female labor force participation impact on housing values? *Research in Economics*, *73*(2), 129-137.

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. *Festschrift in honor of Peter Schmidt: Econometric methods and applications*, 281-314.

Szabó, S., Bódis, K., Huld, T., & Moner-Girona, M. (2013). Sustainable energy planning: Leapfrogging the energy poverty gap in Africa. *Renewable and Sustainable Energy Reviews*, *28*, 500-509.

Tam, H. (2011). U-shaped female labor participation with economic development: Some panel data evidence. *Economics Letters*, *110*(2), 140-142.

Tsani, S., Paroussos, L., Fragiadakis, C., Charalambidis, I., & Capros, P. (2013). Female labour force participation and economic growth in the South Mediterranean countries. *Economics Letters*, *120*(2), 323-328.

Table 1: Fixed effect and GMM analysis- Model A

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Driscoll-Kraay	Pooled OLS	White	Rogers	Newey-West	Fixed effect IV/GMM estimation	Two-step system GMM estimator
Variables	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1
ΔlnFLFP	**1.1764*** (0.2793)**	1.1764 (0.7651)	**1.1764*** (0.3789)**	**1.1764*** (0.3058)**	**1.1764*** (0.3271)**	0.0865 (0.9809)	**0.6226*** (0.1347)**
DEC× ΔlnFLFP	**-1.4270*** (0.4447)**	-1.4270 (1.0162)	**-1.4270*** (0.5403)**	**-1.4270*** (0.4414)**	**-1.4270*** (0.4649)**	0.0036 (1.3345)	**-0.9732*** (0.2068)**
ΔlnEGP (t-1)	-	-	-	-	-	-	**-0.2761*** (0.0165)**
Constant	**-0.0776*** (0.0015)**	**-0.0776*** (0.0237)**	**-0.0776*** (0.0288)**	**-0.0776*** (0.0287)**	**-0.0662*** (0.0172)**		**-0.0535*** (0.0053)**
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	-	-	-	-	-	-	(0.003)
AR(2)	-	-	-	-	-	-	(0.231)
Sargan OIR	-	-	-	-	-	-	(0.002)
Hansen OIR	-	-	-	-	-	-	(0.426)
DHT for instruments							
(a) Instruments in levels							
H excluding group	-	-	-	-	-	-	(0.497)
Diff (null, h=exogenous)	-	-	-	-	-	-	(0.360)
(b) IV(years, eq(diff)							
H excluding group	-	-	-	-	-	-	(0.219)
Diff (null, h=exogenous)	-	-	-	-	-	-	(0.718)
Fisher							135.33***
R-squared	0.0310	0.0310	0.0310	0.0310		0.0295	-
Instruments	-	-	-	-	-	-	43
Countries	50	50	50	50	50	50	50
Observations	697	697	697	697	697	697	647

Table 2: Fixed effect and GMM analysis- Model B

	(1) Driscoll-Kraay	(2) Pooled OLS	(3) White	(4) Rogers	(5) Newey-West	(6) Fixed effect IV/GMM estimation	(7) Two-step system GMM estimator
Variables	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1
ΔlnFLFP	**0.5698****	0.5698	**0.5698***	**0.5698****	**0.5698****	0.1042	**0.5634*****
	(0.2133)	(0.8273)	**(0.3154)**	**(0.2769)**	**(0.2822)**	(1.0280)	**(0.1893)**
DEC× ΔlnFLFP	**-0.8427***	-0.8427	-0.8427	**-0.8427***	**-0.8427***	-0.0471	**-0.8225*****
	(0.4248)	(1.0938)	(0.5190)	**(0.4695)**	**(0.4616)**	(1.3901)	**(0.2482)**
lnFDI	0.0011	0.0011	0.0011	0.0011	0.0011	-0.0049	0.0048
	(0.0018)	(0.0036)	(0.0034)	(0.0026)	(0.0028)	(0.0079)	(0.0034)
URB	**0.0011*****	**0.0011*****	**0.0011*****	**0.0011*****	**0.0011*****	0.0044	**0.0009***
	(0.0003)	**(0.0004)**	**(0.0003)**	**(0.0002)**	**(0.0002)**	(0.0056)	**(0.0005)**
ΔlnEGP (t-1)	-	-	-	-	-	-	**-0.2758*****
							(0.0195)
Constant	**-0.1285*****	-0.0618	-0.0618	-0.0618	**-0.1425****	-	**-0.1535****
	(0.0356)	(0.0688)	(0.0723)	(0.0619)	**(0.0554)**		**(0.0620)**
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	-	-	-	-	-	-	(0.004)
AR(2)	-	-	-	-	-	-	(0.305)
Sargan OIR	-	-	-	-	-	-	(0.004)
Hansen OIR	-	-	-	-	-	-	(0.435)
DHT for instruments							
(a) Instruments in levels							
H excluding group	-	-	-	-	-	-	(0.389)
Diff (null, h=exogenous)	-	-	-	-	-	-	(0.459)
(b) IV(years, eq(diff)							
H excluding group	-	-	-	-	-	-	(0.246)
Diff (null, h=exogenous)	-	-	-	-	-	-	(0.664)
Fisher							93.29***
R-squared	0.0493	0.0493	0.0493	0.0493	-	0.0345	-
Instruments	-	-	-	-	-	-	43
Countries	50	50	50	50	50	50	50
Observations	655	655	655	655	655	655	609

Table 3: Fixed effect and GMM analysis- Model C

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Driscoll-Kraay	Pooled OLS	White	Rogers	Newey-West	Fixed effect IV/GMM estimation	Two-step system GMM estimator
Variables	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1	pctchange1
ΔlnFLFP	**0.5069****	0.5069	**0.5069***	**0.5069***	**0.5069****	0.1978	0.1945
	(0.1893)	(0.8209)	**(0.2967)**	**(0.2624)**	**(0.2489)**	(0.9876)	(0.1413)
DEC× ΔlnFLFP	**-0.7584*****	-0.7584	-0.7584	**-0.7584***	**-0.7584***	-0.0433	-0.3729
	(0.2661)	(1.0588)	(0.4991)	**(0.4207)**	**(0.4097)**	(1.3457)	(0.2272)
UEM	0.0011	0.0011	0.0011	0.0011	**0.0011***	0.0025	**0.0079*****
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	**(0.0006)**	(0.0056)	**(0.0027)**
LIFEEXP	**0.0017*****	**0.0017***	**0.0017****	**0.0017****	**0.0017*****	-0.0056	0.0012
	(0.0004)	**(0.0010)**	**(0.0007)**	**(0.0008)**	**(0.0006)**	(0.0045)	(0.0017)
ΔlnEGP (t-1)	-	-	-	-	-	-	**-0.2646*****
							(0.0199)
Constant	**-0.1848*****	**-0.1848*****	**-0.1848*****	**-0.1848*****	**-0.1848*****		**-0.2075****
	(0.0240)	**(0.0660)**	**(0.0463)**	**(0.0526)**	**(0.0388)**		**(0.0999)**
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	-	-	-	-	-	-	(0.002)
AR(2)	-	-	-	-	-	-	(0.263)
Sargan OIR	-	-	-	-	-	-	(0.023)
Hansen OIR	-	-	-	-	-	-	(0.562)
DHT for instruments							
(a) Instruments in levels							
H excluding group	-	-	-	-	-	-	(0.489)
Diff (null, h=exogenous)	-	-	-	-	-	-	(0.540)
(b) IV(years, eq(diff)							
H excluding group	-	-	-	-	-	-	(0.200)
Diff (null, h=exogenous)	-	-	-	-	-	-	(0.901)
Fisher							89.95***
R-squared	0.0493	0.0493	0.0493	0.0493	-	0.0345	-
Instruments	-	-	-	-	-	-	43
Countries	50	50	50	50	50	50	50
Observations	655	655	655	655	655	655	609

Table 4: Canay (2011) Results-Model A

Variables	(1) 0.05	(2) 0.1	(3) 0.2	(4) 0.3	(5) 0.4	(6) 0.5	(7) 0.6	(8) 0.7	(9) 0.8	(10) 0.9	(11) 0.95
ΔlnFLFP	1.631	**1.783*** **	0.424	0.097	0.073	0.040	-0.049	-0.178	-0.488	-1.284	-1.992
	(2.182)	**(0.500)**	(0.723)	(0.096)	(0.053)	(0.058)	(0.148)	(0.451)	(0.364)	(0.967)	(1.314)
DEC× ΔlnFLFP	-2.521	-1.723	0.149	0.108	-0.033	-0.032	0.082	0.260	0.746	0.641	2.853
	(2.805)	(1.212)	(1.259)	(0.548)	(0.196)	(0.112)	(0.154)	(0.654)	(1.211)	(1.170)	(1.760)
Constant	**-0.330*** **	**-0.233*** **	**-0.126** **	**-0.066*** **	**-0.050*** **	**-0.044*** **	**-0.039*** **	**-0.030*** **	0.003	0.020	**0.115*** **
	(0.065)	**(0.018)**	**(0.062)**	**(0.011)**	**(0.008)**	**(0.004)**	**(0.005)**	**(0.011)**	(0.017)	(0.033)	**(0.042)**
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	697	697	697	697	697	697	697	697	697	697	697

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Canay (2011) Results with FDI and urbanization controls

Variables	(1) 0.05	(2) 0.1	(3) 0.2	(4) 0.3	(5) 0.4	(6) 0.5	(7) 0.6	(8) 0.7	(9) 0.8	(10) 0.9	(11) 0.95
ΔlnFLFP							**-**				
	1.383	**1.292*** **	**0.560** **	0.096	0.007	-0.050	**0.118*** **	-0.179	-0.400	**-1.057* **	-1.066
	(1.765)	**(0.494)**	**(0.285)**	(0.582)	(0.147)	(0.063)	**(0.041)**	(0.156)	(0.299)	**(0.615)**	(1.791)
DEC× ΔlnFLFP	-2.382	-1.343	-0.816	0.129	0.093	0.092	0.150	0.230	0.638	**1.692* **	1.762
	(3.273)	(1.609)	(0.834)	(0.615)	(0.345)	(0.199)	(0.135)	(0.214)	(1.249)	**(0.979)**	(2.404)
lnFDI					**-**	**-**	**-**	**-**			
	0.001	-0.003	**-0.008** **	**-0.003* **	**0.003*** **	**0.003*** **	**0.004*** **	**0.005*** **	-0.003	0.003	-0.004
	(0.007)	(0.006)	**(0.003)**	**(0.002)**	**(0.001)**	**(0.001)**	**(0.001)**	**(0.002)**	(0.004)	(0.005)	(0.009)
URB	**0.008*** **	**0.007*** **	**0.006*** **	**0.005*** **	**0.005*** **	**0.004*** **	**0.004*** **	**0.004*** **	**0.003*** **	**0.002*** **	**0.001*** **
	(0.001)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Constant	-0.593***	-0.441***	-0.227***	-0.232***	-0.213***	-0.174***	-0.156***	-0.100***	-0.082	-0.094	0.106
	(0.158)	(0.125)	(0.073)	(0.036)	(0.022)	(0.019)	(0.017)	(0.033)	(0.072)	(0.102)	(0.177)
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	655	655	655	655	655	655	655	655	655	655	655

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Canay (2011) Results with unemployment and life expectancy controls

Variables	(1) 0.05	(2) 0.1	(3) 0.2	(4) 0.3	(5) 0.4	(6) 0.5	(7) 0.6	(8) 0.7	(9) 0.8	(10) 0.9	(11) 0.95
ΔlnFLFP	1.163	0.718	0.410	0.036	0.152	**0.176*** **	0.094	0.028	-0.103	-0.402	-0.563
	(0.774)	(0.557)	(0.618)	(0.182)	(0.196)	**(0.067)**	(0.125)	(0.105)	(0.230)	(0.858)	(0.979)
DEC× ΔlnFLFP	-2.168	-0.241	-0.508	0.058	-0.054	-0.121	0.003	0.097	0.346	0.867	1.204
	(2.361)	(1.059)	(0.691)	(0.245)	(0.266)	(0.118)	(0.132)	(0.324)	(0.455)	(1.615)	(1.789)
UEM	**0.009*** **	**0.007*** **	**0.004*** **	**0.003*** **	**0.002*** **	**0.002*** **	**0.002*** **	**0.002*** **	0.001	-0.001	**-0.004*** **
	(0.002)	**(0.001)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.001)	(0.001)	**(0.001)**
LIFEEXP	-0.000	**-0.002** **	**-0.003*** **	**-0.005*** **	**-0.005*** **	**-0.005*** **	**-0.006*** **	**-0.006*** **	**-0.008*** **	**-0.011*** **	**-0.012*** **
	(0.002)	**(0.001)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.001)**	**(0.001)**
Constant	**-0.345** **	-0.106	0.074	**0.219*** **	**0.264*** **	**0.274*** **	**0.298*** **	**0.321*** **	**0.497*** **	**0.797*** **	**0.909*** **
	(0.140)	(0.085)	(0.070)	**(0.034)**	**(0.013)**	**(0.009)**	**(0.013)**	**(0.028)**	**(0.058)**	**(0.069)**	**(0.102)**
Year effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	697	697	697	697	697	697	697	697	697	697	697

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1