Preliminary and incomplete
June 3, 2003

Trade Openness and Urban Concentration: New Evidence*

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Abstract

In this paper, I reexamine the empirical relationship between trade openness and urban concentration. In particular, I critically review the available cross-country evidence. I show that previous findings of a negative association between trade openness and the size of a country's largest city are not robust. Also I find no evidence that trade liberalization significantly reduces urban concentration.

* The paper partly draws on chapter 4 of my dissertation "City Growth in Europe". I am grateful to my dissertation advisers Dalia Marin and Michael Burda for encouragement, support and helpful discussions. Opinions expressed in this paper do not necessarily represent the views of Bankgesellschaft Berlin.

JEL Code: F15, R12

Keywords: trade liberalization, urban primacy

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I. Introduction

This short note deals with the question „Is there a relationship between a country's external trade and its internal geography?" or, more precisely, „Does openness matter for urban concentration?" This issue is of interest for at least two reasons.

First, policy-makers and academics are increasingly concerned about excessive concentration; especially in developing countries a disproportionately large share of a country's urban population appears to be concentrated in one or two major metropolitan areas (mega-cities) that strongly dominate the national urban structure. The World Bank (2003, p. 139), for instance, notes in its World Development Report 2003: „[T]he spatial distribution of economic activity in general, and of urban centers in particular, is important to sustainable development. ... Excessive primacy can have real economic efficiency costs to countries." Vernon Henderson (2003) estimates that a deviation from the best primacy level by about 0.1 is associated with a loss in productivity growth by about 0.6% a year. If there is an association between openness to international trade and urban concentration, however, changes in trade policy may be a useful strategy to decentralization.

Second, while for a long time the prevailing view was that the empirical relationship between openness and urban concentration is ambiguous and perhaps positive (with large merchant cities benefiting from a liberal trade regime), there now appears to be a new consensus that the effect is exactly the opposite: *negative* and significant. Paul Krugman (1996, p. 13), for instance, claims that it is one of four stylized facts about urban size distributions that „[m]ore open economies, as measured by the share of exports in gross domestic product, tend to have smaller biggest cities". There are basically three pieces of evidence that support this claim. Several studies by Gordon Hanson document for the case of Mexico that trade liberalization is accompanied by decentralization; the removal of trade

barriers initiated in the mid-1980s appears to have contributed to a relocation of the Mexican industry away from Mexico City toward the northern border of the country (see, for instance, Hanson [1998] and Krugman and Hanson [1993]). Krugman and Raul Livas Elizondo (1996) formalize this story; they develop a model in which access to external markets weakens the agglomeration forces inside the economy, making it more likely that the country's internal structure is spatially dispersed. Finally, Alberto Ades and Edward Glaeser (1995) find in a cross section sample of 85 countries that the share of trade in GDP is negatively related to the size of the largest city, holding other things constant.

In this paper, I reexamine the empirical relationship between trade openness and urban concentration. I do so, first, by critically reviewing the cross-country findings by Ades and Glaeser. In particular, I use Ades and Glaeser's approach as a starting point and then modify and extend their empirical framework. I find that the result of a negative relationship between openness and urban concentration is not robust. In a next step, I focus on trade policy (instead of openness) and explore the effects of changes in a country's trade regime on urban structure. Again, I find no evidence that urban concentration is related to external openness; trade liberalization appears to have no measurable effect on urban primacy. Finally, I provide a meta-analysis to identify potential causes for the differences in the estimated effects of openness on urban concentration.

The remainder of the paper is organized as follows. In the next section, I review Ades and Glaeser's approach and their results. Sections 3 to 5 present the main extensions to their framework, followed by an analysis of the effects of trade liberalization on urban concentration. Section 7 presents the meta-analysis, and section 8 concludes.

II. Retrospective

The paper by Ades and Glaeser (1995, henceforth AG) is extremely comprehensive. In order to determine the factors behind the centralization of a nation's urban population in a major city, they (i) propose a simple theoretical model (to capture the effects of government and politics on urban primacy), (ii) analyze historical case studies, and (iii) explore cross-country evidence. Another interesting empirical contribution is, for instance, that AG document the impact of political forces on the national urban structure. Here, however, I focus exclusively on their empirical finding of a negative association between trade openness and urban concentration.

AG's empirical strategy is highly intuitive. In particular, they estimate an equation of the form:

$$(1) \qquad \ln(CITY) = \alpha + \Sigma_i \beta_i x_i + \Sigma_j \gamma_j y_j + \Sigma_k \delta_k z_k$$

where the x_i's are scale variables for the population size of the largest city, the (log of) nonurbanized population and the (log of) population in other urbanized areas; the y_j's are the main variables of interest: measures of political stability and trade openness; and z_k is a vector of other controls that have the potential to affect the size of the country's largest city. In their basic specification, the controls include the log of land area, the log of real GDP per capita, and the share of labor force outside of agriculture.

AG estimate this equation using observations spanning four different years: 1970, 1975, 1980 and 1985; the data are averaged (instead of applying panel techniques) to abstract from the question of how lagged values of country characteristics might change current urban concentration.

Concerning the main variable of interest, the results seem to be convincing. The estimated coefficient on the share of trade in GDP is consistently negative. Also, in the

benchmark specification, the coefficient is statistically highly significant, with a t-statistic of 2.7. However, AG are also aware that the empirical association between openness and urban concentration is not particularly robust. Of the 7 reported regressions, the coefficient is insignificant in three perturbations. For instance, the magnitude of the estimated coefficient falls sizably if a Latin America dummy is included. Further, additional tests cast doubt on the causality in these correlations. AG conclude (p. 224): „Trade and cities are connected, but it may be that urban concentration is causing low levels of trade, not that low levels of trade induce concentration."

III. Minor Issues: Methodology and Data

In a first exercise, I seek to replicate AG's benchmark results. The first column of table 1 shows (for comparison) the coefficient estimates of AG's basic specification (taken from their table 4). In column 2, I report the estimates of a comparable regression specification. In particular, I tried to obtain data from the same data sources as AG to stay as closely as possible with their analysis; later I will use data from more actual sources which leads to changes in the country sample since some countries have experienced territorial changes (e.g., Ethiopia, Germany, Yemen). City population data are taken from the United Nation's Prospects of World Urbanization, 1988. The UN population database[1] also provides information on a country's total, urbanized and nonurbanized population. Data on real GDP per capita and the share of trade in GDP are from the Penn World Table mark 5.6. Finally, data on the land area and the share of labor force outside agriculture are obtained from the World Bank's World Development Indicators.

[1] Available at http://esa.un.org/unpp.

As shown, most of the point estimates are basically identical with AG's results.[2] The size of a country's largest city rises with the country's total population, although only the coefficient on the log of nonurbanized population is economically and statistically significant. Also country size matters; the coefficient estimate implies that an increase in country size by 10 percent increases the population in the main city by about 1.7 percent. Finally, more developed economies tend to have larger central cities; this effect is completely captured by the share of labor force outside agriculture while the coefficient on real GDP per capita is not significantly different from zero.

Turning to the main variable of interest, the coefficient on the share of trade in GDP is negative and almost of the same magnitude as in AG; the elasticity of –0.55 suggests that an increase in the openness ratio by 10 percent reduces the size of the largest city by about 5.5 percent. However, with a t-statistic of 1.7, the coefficient is only weakly significant. While I do not attempt to interpret this result too literally, the weak significance level may be already a first indication of the low robustness of the association between trade openness and urban concentration.

In column 3, I extend the sample of countries. AG restrict their analysis to 85 countries (and even smaller samples) since they later include additional controls. If I enclose all countries for which I have data, my sample covers 115 countries.[3] As shown, increasing the sample size generally improves the precision of the estimates. The coefficient on the capital city dummy becomes statistically highly significant, and the coefficient on the log of real GDP per capita increases in magnitude and significance. The model also explains a slightly higher proportion (86%) of the variation in the cross-sectional data. Most notably for my purposes,

[2] My sample covers only 84 countries. Ades and Glaeser note that their sample consists of 85 countries, but their data appendix lists only 84 countries.

[3] It should also be noted that all results concerning the relationship between openness and concentration crucially depend on the exclusion of Hong Kong and Singapore. If the two

however, the share of trade in GDP has now a significantly large effect on the size of the main city; the (absolute) t-statistic rises to 2.7.

In the remaining two columns in table 1, I present analogous estimates for the period 1985 to 2000. City population data are now taken from the World Urbanization Prospects: The 2001 Revision. I also use the Penn World Table mark 6.0 and fill in missing data for the openness ratio with information from the World Bank's World Development Indicators. This update does not affect any of the main results. Most of the coefficient estimates are unchanged from the previous 15-year period. Again, the openness variable enters the regression specification negatively and is economically large and statistically highly significant.

To summarize, the evidence from averaged cross-country data basically supports AG's finding of a negative relationship between trade openness and the size of the largest city. It seems that trade liberalization reduces the average size of the central city. In the following, I will examine the robustness of this result.

IV. Absolute Size vs. Urban Primacy

AG's empirical strategy differs from previous attempts to identify determinants of urban concentration in using the absolute size of the country's largest city as dependent variable. Conceptually, this is not necessarily a problem, since the log of urban population outside the main city enters the regression as explanatory variable. Specifically, the estimation equation:

(1a) $\ln(CITY) = \alpha + \beta_1 \ln(URBPOP) + ...$

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highly open city states are included, the coefficient on the share of trade in GDP becomes

is mathematically equivalent to

(1b) $\ln(CITY/URBPOP^{\beta 1}) = \alpha + ...$,

close to a regression specification that uses urban primacy, the share of the largest city in urban population [i.e., ln(CITY/URBPOP)], as dependent variable.

In the results in table 1, however, the point estimates on the log of urban population outside the main city are not different from zero at conventional levels of statistical significance. Therefore, it might be useful to modify the regression specification, using explicitly urban primacy as regressand.

In a first set of regressions reported in table 2, I use the (log of the) share of the main city in urban population outside the main city as dependent variable (i.e., I set β_1=1). This modification indeed changes the results. Not surprisingly, the coefficient on the log of nonurbanized population becomes negative; in more populous countries a smaller share of the population tends to be concentrated in a central city. Further, the level of economic development (as measured by the share of the labor force outside agriculture) now appears to be uncorrelated with a country's urban concentration. Even more noteworthy is, however, that the coefficient on the variable of interest, the share of trade in GDP, is not significantly different from zero. Trade openness has obviously no measurable effect on urban primacy.

A second set of estimates applies a more conventional regression specification, using the (log of the) share of the main city in *total* urban population as dependent variable.[4] For this limited dependent variable, the coefficient on the trade-to-GDP ratio becomes statistically significant, suggesting that openness affects primacy. In general, however, the results

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positive.

[4] See, for instance, Henderson (2002).

highlight the sensitivity of the empirical relationship between openness and concentration to the regression specification.

V. Moving Down the City Size Distribution

In another modification, I again use (the log of) absolute city size as dependent variable, but gradually extend the number of cities below the country's largest city. Interaction variables then capture the extent to which the main city is different from the rest of the city size distribution.[5] The main source of data is again the UN's World Urbanization Prospects which compiles information on all cities with more than 750,000 inhabitants, filled in with data from Vernon Henderson's world cities database.[6]

The results are tabulated in table 3. At least three observations are noteworthy. First, extending the sample of cities below the main city appears to reduce the significance of the openness variable. Second, in all perturbations, the interaction term on trade openness and the main city is not statistically different from zero. Finally, the capital city effect which suggests that cities with political functions tend to be disproportionately large is not dependent on a country's central city.

VI. Liberalization Effects

Having experimented with several variations of the dependent variable, I now modify the external openness measure. Instead of simply defining openness as the share of trade in GDP, I now focus more explicitly on a country's trade policies. This approach has several

[5] Nitsch (2001) proposes a similar approach for historical European data.
[6] The data has been gratefully made available by Vernon Henderson at http://econ.pstc.brown.edu/faculty/henderson/worldcities.html.

advantages. For one thing, trade policy (unlike the trade-to-GDP ratio) appears to be completely unrelated to other country characteristics. More importantly, however, this approach deals directly with the policy question of interest, namely: does trade liberalization reduce urban concentration?

To accurately measure a country's overall trade policy stance is a difficult task. Types of trade restrictions vary considerably, ranging from tariff and nontariff barriers to exchange rate distortions and state monopolies, so that different indicators often give different results.[7] Fortunately, a summary measure is readily available: a dummy variable that classifies countries as open or closed to international trade, constructed by Jeffrey Sachs and Andrew Warner (1995). According to this measure, a country is classified as closed if it displays at least one of the following five characteristics: an average tariff rate of 40% and more; nontariff barriers covering 40% or more of trade; a black market exchange rate that is depreciated by 20% or more relative to the official exchange rate; a state monopoly on major exports; and a socialist economic system. While this methodology is not without criticisms (see Dani Rodrik and Francisco Rodriguez [2000]), Romain Wacziarg and Karen Welch (2002) argue that the dates of trade liberalization derived from both quantitative data and a detailed review of country-specific case studies of reform are a reliable indicator; I use Wacziarg and Welch's corrected and updated data.

In the actual implementation, I run a regression of the form:

$$(2) \qquad \ln(CITY_{it}/URBPOP_{it}) = \gamma_i + \delta\, LIBERAL_{it} + \varepsilon_{it} \ ,$$

where *LIBERAL*=1 if *t* is greater than the year of trade liberalization (and 0 otherwise), and δ is the variable of interest to me. With the inclusion of country fixed-effects, estimates of δ

then indicate the within-country variation in urban primacy resulting from a discrete change in trade policy openness.

The results are presented in table 4. I begin with regression results for *LIBERAL* set to 1 when a period of uninterrupted openness began and no reversal of the trade policy reforms occurred, reported in the first part of table 4. As shown, I experiment with several specifications (including a time trend and year dummy variables). In all specifications, δ is indeed negative, indicating that countries that liberalized their trade regime experienced a decline in urban primacy. However, the estimated within-country effect is economically small, averaging about 1%, and rarely statistically significant. In table 4b, *LIBERAL* is defined to also allow for periods of temporary trade liberalization. Not surprisingly, the estimation results are even weaker. While all estimates of δ remain negative, none of the estimates is different from zero at conventional levels of statistical significance. The large variation in the evolution of urban primacy, unrelated to trade regime, is illustrated in figures 1 and 2 which plot some (carefully chosen) case studies.

VII. Meta-Analysis

Since estimates of the effect of trade openness on urban concentration vary considerably, it might be interesting to identify factors that help to explain these differences. A useful way to review the empirical literature is meta-analysis; T. D. Stanley (2001) provides an overview of this technique.[8]

[7] Reviewing the literature, Andrew Rose (2003) has recently compiled 64 different trade policy indicators.

[8] Recent applications of meta-analysis include Rose (2004) on the effect of common currencies on trade, Anne-Célia Disdier and Keith Head (2003) on estimates of the distance effect in gravity models, and Nitsch (2003) on estimates of Zipf coefficients in city-size distributions.

In order to determine the studies to be included in the analysis, I follow a two-step procedure. In a first step, I perform an Econlit search for the phrases „urban primacy" and „urban concentration" in either the title, the keywords or the abstract of a paper; Econlit covers the period from 1969 to today. The resulting 35 studies are then checked for empirical estimates of the association between openness and concentration. It turns out that of a reduced sample of 26 studies (I was unable to obtain three papers; one entry was a Ph.D. dissertation; two studies were in french; and three studies were dropped as double entries) only 13 studies are empirical analyses of the determinants of urban concentration, of which only six studies include a measure of external openness. In a second step, therefore, I also checked the studies referenced in these papers; this procedure also allows to include studies published before 1969.

To be completed.

VIII. Conclusion

Urban primacy, the extent to which a country's largest city dominates the national urban system, varies considerably across countries. Panama City comprises more than 70% of Panama's total urban population, while in neighboring Costa Rica only 42% of the national urban population are concentrated in San José, and the ratio even drops to 28% for Honduras's largest city, Tegucigalpa.

A potential explanation for these differences that has recently gained considerable prominence is that differences in external openness might matter: countries open to international trade tend to have less dominant central cities than close economies, other things equal. In this paper, I examine the empirical evidence for this hypothesis. Providing a large

variety of empirical tests, I find at best only weak support for the claim that trade liberalization reduces urban concentration.

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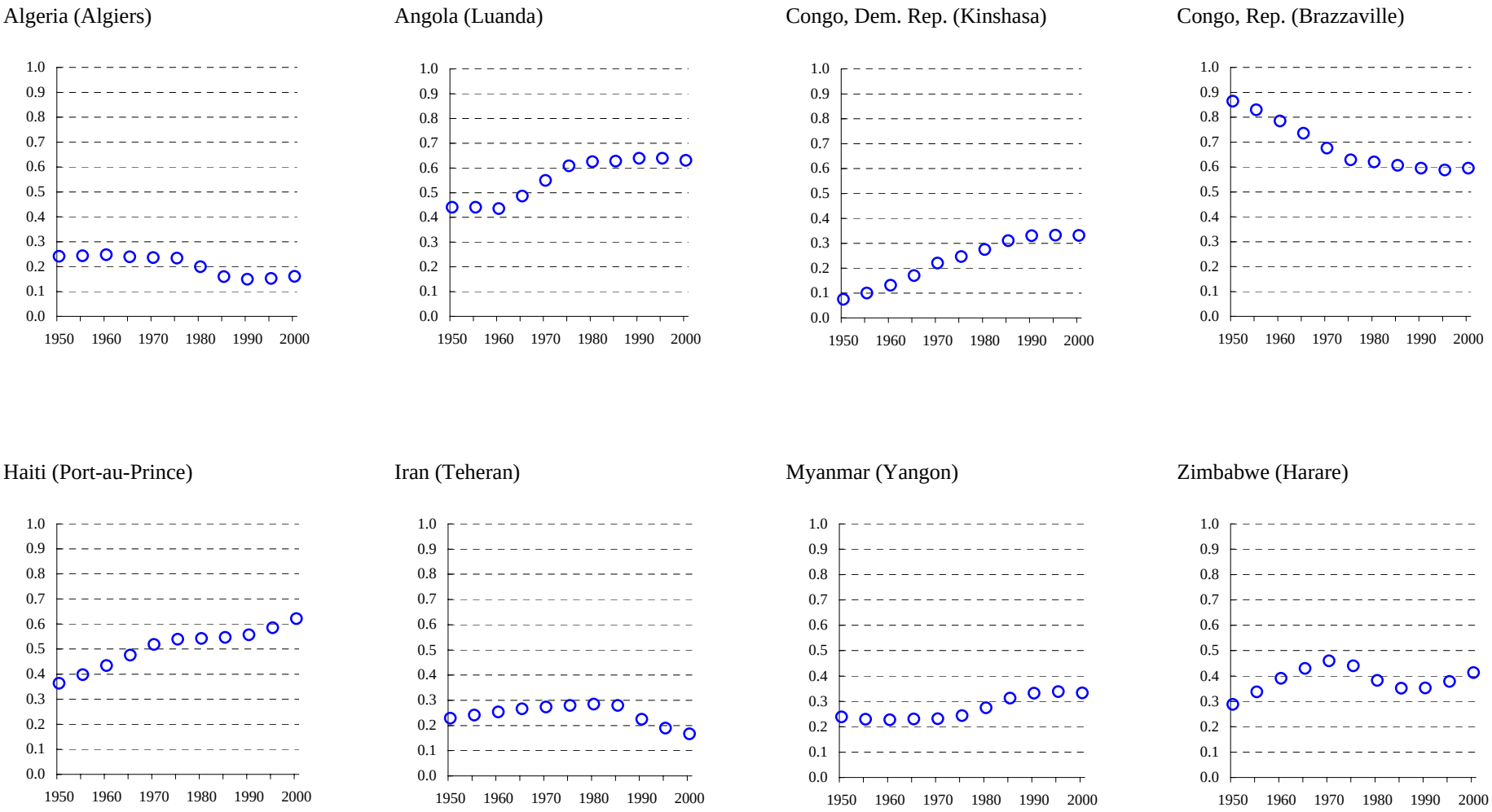
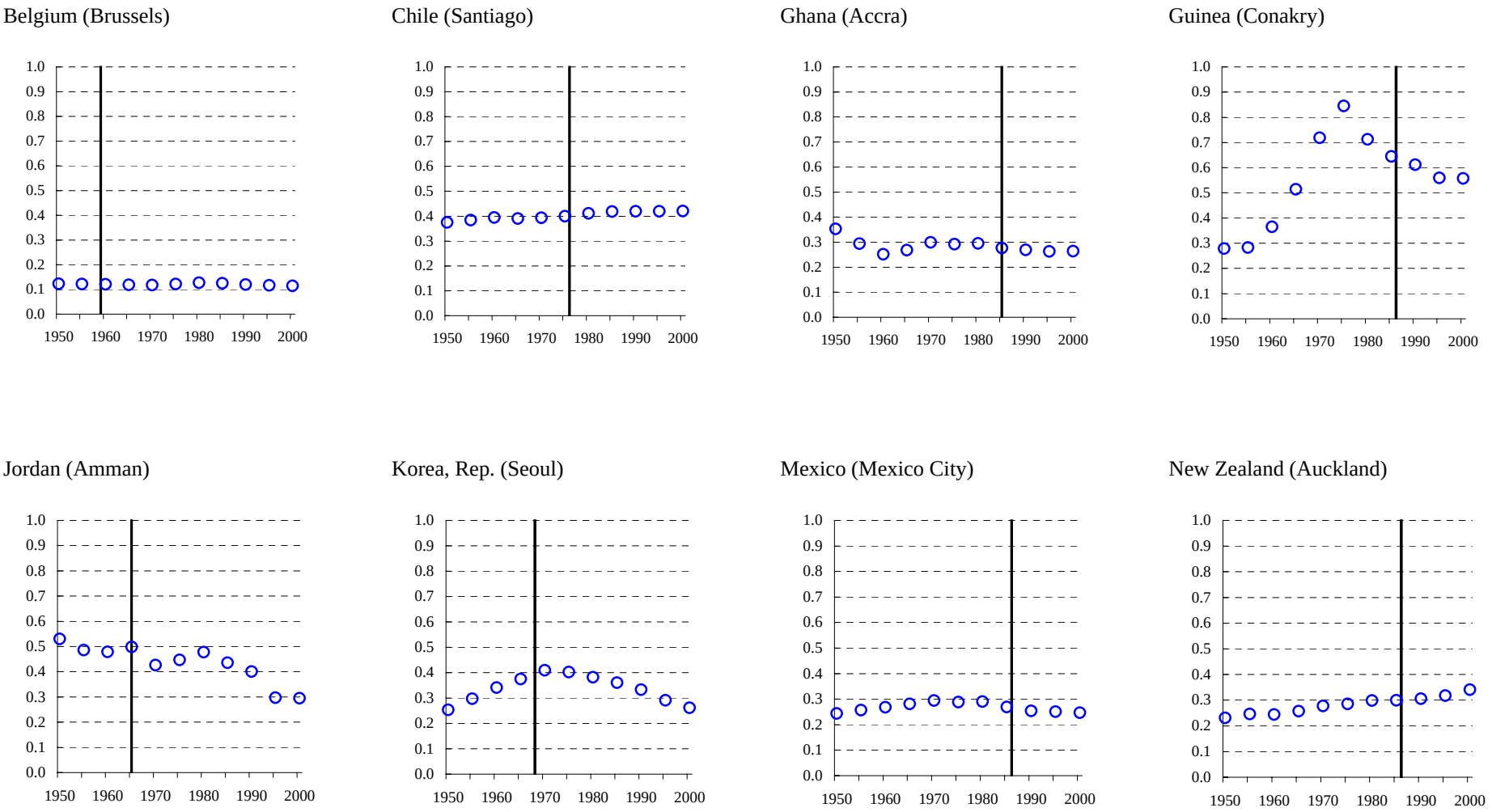
Figure 1: Urban Primacy and Trade Liberalization — Closed Countries



Note: These countries were consistently classified as closed.

Figure 2: Urban Primacy and Trade Liberalization — Open Countries



Note: The vertical line shows the date of trade liberalization.

Table 1: Minor Modifications

	A&G (1995)	Basic	More countries	Other period	
Time period	1970-85	1970-85	1970-85	1985-2000	1985-2000
Country sample	A&G	A&G	Full sample	A&G	Full sample
Capital city dummy	0.465*	0.426#	0.509**	0.383*	0.480**
	(0.196)	(0.220)	(0.140)	(0.163)	(0.148)
Log of nonurbanized population	0.553**	0.521**	0.582**	0.364**	0.421**
	(0.066)	(0.090)	(0.059)	(0.076)	(0.066)
Log of urbanized population outside the main city	0.066	0.074	0.035	0.151*	0.130*
	(0.045)	(0.051)	(0.047)	(0.061)	(0.063)
Log of land area	0.155**	0.173**	0.085*	0.119*	0.090#
	(0.049)	(0.053)	(0.040)	(0.048)	(0.047)
Log of real GDP per capita	0.058	-0.098	0.295#	0.120	0.102
	(0.131)	(0.176)	(0.166)	(0.113)	(0.109)
Share of the labor force outside of agriculture	2.556**	3.274**	2.151**	1.837**	1.964**
	(0.567)	(0.646)	(0.603)	(0.480)	(0.450)
Share of trade in GDP	-0.609**	-0.547#	-0.682**	-0.586*	-0.722**
	(0.225)	(0.314)	(0.251)	(0.238)	(0.223)
Number of observations	85	84	115	79	108
Adjusted R^2	0.81	0.82	0.86	0.81	0.83

Notes: OLS estimation. Dependent variable is the log of population in the main city. The regressions are based on averaged data for the given period, available in five-year-intervals. White heteroskedastic-consistent standard errors are in parentheses. **, * and # denote significant at the 1%, 5% and 10% level, respectively. Constant not reported.

Table 2: Urban Primacy Measures as Dependent Variable

Dependent variable	Log of share of main city in urban pop. outside the main city				Log of share of main city in total urban population			
	Basic	More countries	Other period		Basic	More countries	Other period	
Time period	1970-85	1970-85	1985-2000	1985-2000	1970-85	1970-85	1985-2000	1985-2000
Country sample	A&G	Full sample	A&G	Full sample	A&G	Full sample	A&G	Full sample
Capital city dummy	0.593*	0.393#	0.489*	0.493**	0.384#	0.301*	0.335*	0.378**
	(0.237)	(0.202)	(0.208)	(0.167)	(0.206)	(0.148)	(0.220)	(0.122)
Log of nonurbanized population	-0.464**	-0.425**	-0.450**	-0.419**				
	(0.097)	(0.079)	(0.077)	(0.061)				
Log of total population					-0.506**	-0.422**	-0.500**	-0.423**
					(0.075)	(0.058)	(0.059)	(0.047)
Log of land area	0.158	0.067	0.123#	0.084	0.170*	0.084	0.111#	0.072
	(0.101)	(0.084)	(0.072)	(0.076)	(0.075)	(0.058)	(0.059)	(0.055)
Log of real GDP per capita	-0.500*	0.242	-0.077	-0.087	-0.338#	0.054	0.019	-0.038
	(0.243)	(0.346)	(0.177)	(0.157)	(0.202)	(0.191)	(0.133)	(0.112)
Share of the labor force outside of agriculture	2.548*	-0.276	0.850	0.590	2.521**	1.017	0.897	0.936#
	(0.958)	(1.325)	(0.834)	(0.684)	(0.765)	(0.686)	(0.590)	(0.475)
Share of trade in GDP	-1.137#	-0.410	-0.572#	-0.427	-1.038*	-0.699*	-0.687**	-0.682**
	(0.605)	(0.418)	(0.332)	(0.335)	(0.433)	(0.319)	(0.242)	(0.236)
Number of observations	84	115	78	107	84	115	79	108
Adjusted R^2	0.33	0.31	0.39	0.38	0.46	0.44	0.52	0.49

Notes: OLS estimation. Dependent variable is the log of population in the main city. The regressions are based on data for the given period available in five-year-intervals. White heteroskedastic-consistent standard errors are in parentheses. **, * and # denote significant at the 1%, 5% and 10% level, respectively. Constant not reported.

Table 3: Are Main Cities Different?

Time period City sample	1970-85 Main City	1970-85 Top 2 Cities	1970-85 Top 3 Cities	1970-85 Top 4 Cities	1970-85 Top 5 Cities	1970-85 Top 5 Cities
Capital city dummy	0.414** (0.119)	0.633** (0.116)	0.540** (0.113)	0.415** (0.142)	0.376** (0.136)	0.412** (0.130)
Capital city × Largest city		-0.187 (0.180)	-0.060 (0.184)	0.097 (0.218)	0.160 (0.224)	0.096 (0.207)
Log of nonurbanized population	0.559** (0.060)	0.577** (0.082)	0.542** (0.080)	0.539** (0.077)	0.532** (0.086)	0.552** (0.064)
Log of urbanized population outside the main city	0.052 (0.049)	0.069 (0.065)	0.137* (0.064)	0.143* (0.056)	0.150* (0.063)	0.107* (0.047)
Log of land area	0.074 (0.047)	0.130* (0.050)	0.144** (0.049)	0.166** (0.053)	0.186** (0.055)	0.161** (0.043)
Log of real GDP per capita	0.272 (0.175)	-0.010 (0.147)	0.116 (0.132)	0.132 (0.145)	0.148 (0.152)	0.094 (0.125)
Share of the labor force outside of agriculture	2.117** (0.657)	3.069** (0.568)	2.532** (0.504)	2.503** (0.543)	2.414** (0.565)	2.649** (0.469)
Share of trade in GDP	-0.746* (0.310)	-0.278 (0.417)	-0.078 (0.377)	0.009 (0.389)	0.178 (0.388)	0.005 (0.316)
Share of trade in GDP × Largest city		-0.025 (0.277)	-0.066 (0.268)	-0.053 (0.288)	-0.168 (0.282)	-0.378 (0.301)
Number of observations (countries)	103 (103)	158 (79)	219 (73)	272 (68)	320 (64)	394 (103)
Adjusted R^2	0.85	0.85	0.86	0.86	0.88	0.86

Notes: OLS estimation. Dependent variable is the log of city population. The regressions are based on data for the given period available in five-year-intervals. White heteroskedastic-consistent standard errors are in parentheses. **, * and # denote significant at the 1%, 5% and 10% level, respectively. Constant and controls for city rank in national size distribution not reported.

Table 3 (continued): Are Main Cities Different?

Time period	1985-2000	1985-2000	1985-2000	1985-2000	1985-2000	1985-2000
City sample	Main City	Top 2 Cities	Top 3 Cities	Top 4 Cities	Top 5 Cities	Top 5 Cities
Capital city dummy	0.350**	0.669**	0.571**	0.500**	0.473**	0.499**
	(0.128)	(0.197)	(0.167)	(0.159)	(0.156)	(0.146)
Capital city × Largest city		-0.264	-0.173	-0.103	0.046	-0.061
		(0.256)	(0.237)	(0.242)	(0.243)	(0.221)
Log of nonurbanized population	0.445**	0.497**	0.416**	0.381**	0.345**	0.415**
	(0.065)	(0.089)	(0.084)	(0.085)	(0.090)	(0.072)
Log of urbanized population outside the main city	0.123#	0.084	0.177*	0.208**	0.220**	0.169**
	(0.062)	(0.086)	(0.076)	(0.077)	(0.077)	(0.063)
Log of land area	0.069	0.128*	0.133**	0.139**	0.158**	0.142**
	(0.048)	(0.050)	(0.049)	(0.051)	(0.050)	(0.039)
Log of real GDP per capita	0.086	0.011	0.038	0.003	0.056	0.037
	(0.111)	(0.120)	(0.129)	(0.123)	(0.133)	(0.110)
Share of the labor force outside of agriculture	2.011**	2.460**	2.231**	2.305**	2.075**	2.285**
	(0.471)	(0.513)	(0.541)	(0.514)	(0.572)	(0.451)
Share of trade in GDP	-0.612**	-0.484#	-0.436#	-0.519*	-0.569*	-0.419*
	(0.225)	(0.255)	(0.222)	(0.251)	(0.252)	(0.194)
Share of trade in GDP × Largest city		0.180	0.158	0.098	-0.070	-0.061
		(0.207)	(0.218)	(0.288)	(0.295)	(0.205)
Number of observations (countries)	111 (111)	174 (87)	237 (79)	300 (75)	340 (68)	424 (111)
Adjusted R^2	0.81	0.81	0.82	0.84	0.85	0.83

Notes: OLS estimation. Dependent variable is the log of city population. The regressions are based on data for the given period available in five-year-intervals. White heteroskedastic-consistent standard errors are in parentheses. **, * and # denote significant at the 1%, 5% and 10% level, respectively. Constant and controls for city rank in national size distribution not reported.

Table 4: The Effects of Trade Liberalization on Urban Primacy

a) Liberalization date derived from year when uninterrupted openness began

Time period	1950-2000	1950-1975	1975-2000
	Country fixed effects		
Liberal trade regime	-0.010#	-0.005	-0.011#
	(0.005)	(0.005)	(0.006)
Number of observations	1,122	612	612
Adjusted R^2	0.91	0.94	0.95
	Country fixed effects with trend		
Liberal trade regime	-0.012#	-0.017**	-0.005
	(0.006)	(0.006)	(0.006)
Year	-0.0001	0.0008**	-0.0004#
	(0.0001)	(0.0003)	(0.0002)
Number of observations	1,122	612	612
Adjusted R^2	0.91	0.94	0.95
	Country and year fixed effects		
Liberal trade regime	-0.012#	-0.018**	-0.008
	(0.006)	(0.006)	(0.007)
Number of observations	1,122	612	612
Adjusted R^2	0.91	0.94	0.95

Notes: OLS estimation. Dependent variable is urban primacy defined as the share of the main city in total urban population. The regressions are based on data for the given period available in five-year-intervals. Huber-White robust standard errors are in parentheses. **, * and # denote significant at the 1%, 5% and 10% level, respectively. Country and (if applicable) year effects not reported. The sample comprises 102 countries.

Table 4 (continued): The Effects of Trade Liberalization on Urban Primacy

b) Additionally allowing for periods of temporary liberalization

Time period	1950-2000	1950-1975	1975-2000
	Country fixed effects		
Liberal trade regime	-0.008	-0.001	-0.010
	(0.005)	(0.004)	(0.006)
Number of observations	1,122	612	612
Adjusted R^2	0.91	0.94	0.95
	Country fixed effects with trend		
Liberal trade regime	-0.008	-0.007	-0.004
	(0.005)	(0.005)	(0.006)
Year	-0.0000	0.0007*	-0.0004#
	(0.0001)	(0.0003)	(0.0002)
Number of observations	1,122	612	612
Adjusted R^2	0.91	0.94	0.95
	Country and year fixed effects		
Liberal trade regime	-0.007	-0.007	-0.006
	(0.005)	(0.005)	(0.006)
Number of observations	1,122	612	612
Adjusted R^2	0.91	0.94	0.95

Notes: OLS estimation. Dependent variable is urban primacy defined as the share of the main city in total urban population. The regressions are based on data for the given period available in five-year-intervals. Huber-White robust standard errors are in parentheses. **, * and # denote significant at the 1%, 5% and 10% level, respectively. Country and (if applicable) year effects not reported. The sample comprises 102 countries.