

# Capitalist Development and Democracy in Latin America

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Event History Analysis

under recurrent events, competing risks, and  
path dependence

# 1. Introduction

- This draft is aimed at testing Rueschemeyer, Stephen, and Stephen (1992, hereafter RSS) on how to explain the political regime change in Latin America by taking advantages of event history analysis.
- A lot of studies have been done on the relationship between capitalist development and democracy in Latin America. Among comparative historical analyses, O'Donnell(1979) is interested in how the state and class-based politics in developing countries responded to problems engendered by their economic and political dependence on developed countries. Among quantitative analyses, to name a few, Lipset(1959), Cutright(1963), Bollen(1979), and Muller(1988, 1989).

- RSS(1992) places the relationship between the two in Latin America in the more comprehensive framework, they called, “relative class power model of democratization.”
- However, they have the tendency to underestimate quantitative analysis for several reasons. As they see it, statistical analysis supports the overall positive correlation between capitalist development and democracy, but it alone does not explain the black box, that is, social mechanisms. This is why they prefer ‘analytic induction’ based on comparative historical research which is different from variable-oriented approach (statistical analysis) or case-oriented approach (qualitative analysis) although they did not do anything to investigate causal mechanisms by using QCA (qualitative comparative analysis) or small-N analysis.

- Their overall assessment on statistical analysis in general and cross-sectional studies in particular makes sense, but it seems that they throw the baby out with bath water. What is interesting to me is that event history analysis is disregarded although they emphasize historical sequence here and there and provide a good source of data for that technique in Chapter 5. Paradoxically, a lot of their description is truly related to jargons in event history analysis. They also stress the importance of path dependence, called “institutionalization effect” (p.206). For instances, “The paths followed by different countries forked at critical junctures, opening some options for the future and closing others” (p.225) Also, “A tradition and/ or relatively recent precedent of military intervention increases the likelihood of renewed intervention” (p.195)

- “There is little doubt that causal explanations cannot be tested directly with cross-sectional studies and that it is diachronic propositions and studies of historical sequence that are needed for settling the issues of a causal interpretation of cross-sectional findings” (Ibid: 28-9).
- They evaluate Hannan and Carroll (1981) in the following way. “A last quantitative study to be reviewed here departs from the cross-sectional mode of analysis of earlier work. Hannan and Carroll (1981) seek to identify social and economic correlates of transitions from one formal political structure to another. This ‘event-history method’ partially confirms, partially modifies and complements the findings of cross-sectional research” (Ibid: 19), but they “did take the historical dimension into account, however minimally and crudely” (Ibid: 29).

## 2. Why event history analysis and how to tackle multiple recurrent events?

- Event history analysis alone can tell a little about causal mechanisms, but this technique is the most appropriate to estimate effects of covariates on the qualitative change, the regime transition from one to another.
- As one of recent quantitative analyses, Mainwaring and Pérez-Liñán(2005) used “rare event logistic regression (RELogit),” a statistical technique designed for dependent variables in which the distribution of the dichotomous outcome is very uneven. But, some cases were excluded in the analysis because they did not experience the regime change during the observation period. It is well known that one of advantages in event history analysis can handle those censored cases.

- Surprisingly, only two studies on the political regime change in Latin America employed event history analysis so far.
- First, Hannan and Carroll (1981), dividing the dependent variable into four categories, traditional no-party states, military regimes, one-party states, and multiparty states, applied event history analysis to their data from 1950 to 1975 where some are countries in Latin America. To test effects of covariates on the rate of change in political form, the instantaneous transition rates can be expressed by:

$$\begin{aligned}
 r_{jk}(t) &= \lim_{\Delta t \rightarrow 0} \Pr_{jk}(t, t + \Delta t) / \Delta t \\
 &= \exp[\alpha_0 + \alpha_1 X_1(t') + \dots + \alpha_k X_k(t')]
 \end{aligned}$$

- where  $t'$  denotes the time of entry into the political form occupied at  $t$ , and  $P_{jk}$  is a transition probability from state  $j$  to  $k$ . This could be another way of handling competing risks.
- Focusing on specific types of transition (all spells), one of their findings is that ethnic diversity has the negative effect on the transition rate for 'all types,' while its direction might differ the origin state considered (e.g. military, one-party, multiparty).
- They also discussed: "If the Markov assumption does not hold, it is not legitimate to pool spells for the same country; history must be taken into account. We have too few observations to conduct any extensive non-Markovian analysis. Instead, we report analyses that use only the first spells for each country" (p.25-6). It is obvious that unlike the all-spells analysis, the dependence of cases is not problematic with the first-spells analysis (i.e., by focusing only on the first sequence).

- Suffice to say here that Markov processes assume no “path dependence” or “structural inertia.” This is why they suggest: “If the first spell results differ substantially from those that use all spells, we suspect that ignoring higher-order dependence gives misleading qualitative conclusions regarding causal effects” (p.25-6). Nonetheless, comparing two results could be rough to detect even whether the Markov assumption is met (See the footnote 10).
- What I discussed so far boils down to how to tackle the thorny problem of recurrent events under competing risks and path dependence: The autocorrelation would be problematic in the pooled analysis if the occurrence of a previous event influenced the hazard of another event that follows. The event that follows could be the same (i.e., a single recurrent event) or different (multiple recurrent events under competing risks).

- In another recent study done by Gasiorowski (1995) where he collected the data from 75 developing countries, “the event in question is either democratic breakdown or democratic transition” (p.887).
- Since he estimated effects of covariates in separate models (one is for democratic breakdown; the other for democratic transition), this strategy might be able to handle multiple events. However, he did not provide any discussion of multiple repeatable events in event history analysis. (esp. the dependence of cases in recurrent events).
- Given three types of regime, 1) democratic, 2) semidemocratic, 3) nondemocratic, another problem is that his approach cannot tell the difference between  $1 \rightarrow 2$  and  $2 \rightarrow 3$  (both are examples of breakdown) or between  $3 \rightarrow 2$  and  $2 \rightarrow 1$  (both are examples of transition). Of course, such distinction would decrease the sample size.

- Let me spend some time on how to handle multiple repeatable events under path dependence, drawing on Allison(1984).
- By definition, repeatable events imply that every case has the chance of experiencing the same event more than twice during the given observation period. Most of analyses have been interested in what if a single event is repeatable rather than what if multiple events are recurrent.
- By definition, multiple events mean that there are more than two events of interest. Furthermore, only one type of event can occur per subject given a time point, which tells that the occurrence of one type of event removes the individual from the risk set for the other type of event.
- By definition, path dependence implies that a former event affects the hazard of a latter event. Here, two events might be the same type or different.

# 1) Recurrent events

- First, conduct a separate analysis for each successive event. (e.g. stratified by sequence). The number of outputs is the same with the maximum number of sequence. This might be reasonable only if the model is expected to differ from one sequence to another.
- Another approach treats each of intervals as a separate observation and pools all intervals to estimate a single model. In this method, however, it is assumed that the dependence of the hazard on time since last event has the same form for each successive event. Also, the multiple intervals must be statistically independent.

- As an alternative, one might want to introduce a random disturbance term representing unobserved heterogeneity and dependency: “Subject specific models.”
- Second, it is also a good idea to add an explanatory variable that measure the prior event history of individuals.
- The third method based on fixed-effect partial likelihood suggests a stratified model by individuals rather than by intervals. This FEPL approach only estimates coefficients for covariates that vary across or within successive spells for each person, controlling for covariates that are stable over time.

## 2) Competing risks

- Here are two situations: 1) the occurrence or nonoccurrence of an event is determined by one causal process; given that an event occurs, a second causal process determines which type occurs; 2) The occurrence of each event type has a different causal structure.
- The second situation again can be classified into: a) The occurrence of one event type removes the individual from risk of the other event type (called, 'competing risk'); b) The occurrence of one type of event removes the individual from observation of other event types; c) The occurrence on one kind of event affects neither the risk of occurrence nor the observation of other kinds of events; d) The occurrence of one kind of event raises or lowers (but not to zero) the hazard of the other kind of event.

- The situation I should tackle in this study are (b) and (d) above: competing risk and path dependence. To handle competing risks, the cause-specific approach is recommended where separate survival analysis for each event type should be done while all other types of events are regarded as censored. Hence, making a distinction between different types of events might lead to different effects of the same set of explanatory variables.

- Two questions could be raised: 1) The independence of competing risks is assumed. Allison shortly discussed this issue (p.50) (He mentioned RATE (Tuma) can do simultaneous estimation for multiple kinds of events, but I do not know how to get RATE. Few results on the Internet); 2) How to test whether coefficients really differ across different types of events? Allison did not say much about this issue, unfortunately (but, pp.63-4).
- Directing the attention to path dependence, as Dr.Hanneman told, Allison also suggest defining a new time-varying covariate by the occurrence of the first event in the analysis of the second event.

# 3) Change of states

- Until far three issues - recurrent events, competing risks, and path dependence – can be solved. What else is still problematic, then?
- Allison discussed how to model the transition rate.
- Recalling the cause-specific hazard rate for competing risk:

$$h_j(t) = \lim_{s \rightarrow 0} \Pr_j(t, t + s) / s$$

- The transition rate:  $r_{ij}(t) = \lim_{s \rightarrow 0} \Pr_{ij}(t, t + s) / s$
- Therefore, the cause-specific hazard function is just transition rate for the special case in which all individuals begin in the same origin state.

- Allison proposed three steps: 1) Break each individual's event history into a set of intervals between events; 2) Separate these intervals into groups according to origin state; 3) For each origin state, estimate models for multiple kinds of events. Each destination state corresponds to a different event type.

# 3. Data and Variables

- Observation period: 1970 to 1995
- Countries: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, and Venezuela.
- Variables and sources:
  - 1) country
  - 2) year
  - 3) reg\_rss (4 fully democracy; 3 restricted democracy; 2 bureaucratic authoritarianism; 1 traditional, populist, military or corporatist authoritarianism)
  - 4) evt\_rss (1 event; 0 none)

- 5) gdp\_pcap (GDP per capita (constant 2000 US dollars))
- 6) openk (Exports plus Imports divided by RGDPL. This is the constant price equivalent of the OPENC variable and is the total trade as a percentage of GDP)
- 7) debt (External debt)
- 8) cpi (Consumer price index)
- 9) caporg (1: exist since foundation; 0 no existence since dissolution)
- 10) expsec: main export sector (1 national control; 2 enclave)
- 11) agrlabor: the degree of labor force requirements for dominant type of agriculture (1 low; 2 high)
- 12) industry: the extent to which industrialization was achieved around 1950 (1 low; 2 medium; 3 high)
- 13) labencap: State's encapsulation of labor (1 low; 2 high)

- 14) lpower: labor movement's power since 1950 (1 weak; 2 relatively weak; 3 medium; 4 relatively strong; 5 strong)
- 15) party: (1 one dominant political party; otherwise 0)
- 16) expan: significant export expansion (1 yes; 2 no)
- 17) agri: type of export economy (1 labor intensive; 2 non-labor intensive; 3 minerals)
- 18) agent: agent shaping the political articulation of subordinate classes (1 state; 2 clientelistic parties; 3 radical mass parties)
- 19) timing: timing of industrialization (1 before 1930; 2 1930-45; 3 after 1945)
- 20) urban: Percentage of the population that is urban resident. Data taken from World Development Indicators 2001 (Washington, D.C.: World Bank).
- 21) worldp: Country's position in the world-system (1 periphery; 2 semiperiphery)

# Dependent variable

- Two types of events: 1) Democratization coded as 1 (from 1 or 2 to 3 or 4); 2) Breakdown as coded as 2 (from 3 or 4 to 1 or 2). There are no cases for  $(3 \rightarrow 4)$  or  $(2 \rightarrow 1)$ .
- Argentina (2 units. i.e., recurrent), Bolivia, Brazil, Ecuador, Chile, Peru, Uruguay are included for the first type of transition (all others are censored), while Argentina, Chile, Uruguay for the second type (all others are censored).

# Covariates (economic development and three layers of power)

- From the perspective of political economy, RSS hypothetically argue, “The chances of democracy must be seen as fundamentally shaped by the balance of class power” (p.47). In addition to the economic development which has been the key variable, they suggest examining three layers of power relations: 1) the balance of class power in civil society as the most critical aspect; 2) the balance of power between the state and civil society and the relative autonomy of the state; 3) transnational structures of power.

- Economic development (gdp\_pcap, cpi)
- Class power and class coalition (caporg, timing, lpower, agri)
- State autonomy and the state-civil society relation (labencap, agent, urban, party)
- Transnational power (openk, worldp)
- Rather than distinguishing some variables accounting for democratization and others accounting for breakdown, I assume different effects of the same variables for different type of transition.
- Lagged effect of time-varying covariates considered (gdp\_pcap, cpi, caporg, urban, and openk)
- For path dependence, a new tvc inserted.
- To avoid the multicollinearity, some variables are excluded based on the frequency table and Pearson's coefficients. For example, agrlabor/ agri, industry/ timing and so on. (b/c they show the perfect association) Especially, DEBT is another important variable recalling the debt crisis in Latin America, but it is moderately correlated to OPENK.

# 4. Hypotheses

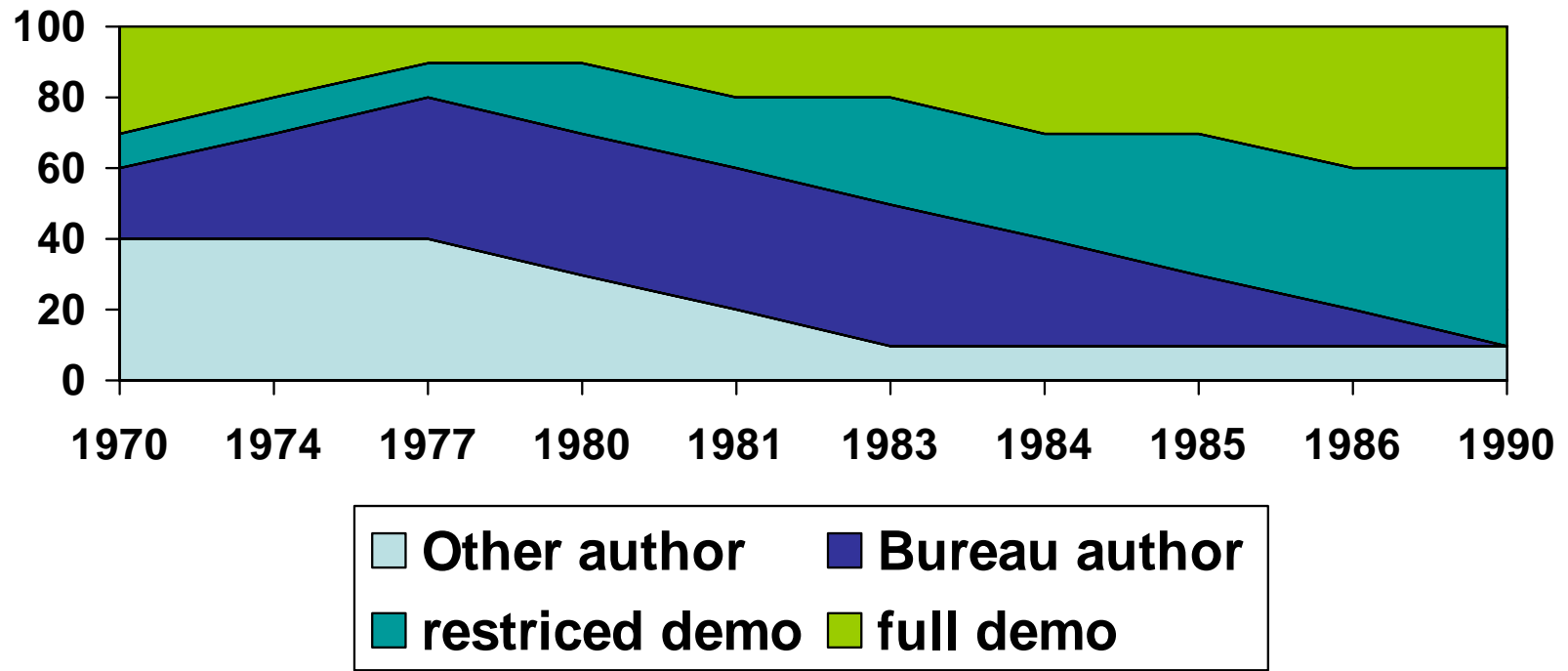
- H1: Economic development (gdp\_pcap) has the positive impact on democratization, while economic instability (cpi) has the positive effect on breakdown.
- H2a: Organized business (caporg) has little impact on democratization or breakdown, but more impact on the consolidation of existing regime. (RSS did not spend much on the role of bourgeoisie in Latin America).
- H2b: the earlier the industrialization (timing), the more favorable to democratization.
- H2c: Organized labor (lpower) is likely to take the lead in democratization rather than breakdown, but its impact is not big. (RSS emphasize the role of middle classes in Latin America).

- H2d: Labor intensive agriculture has the negative effect on democratization by producing landlord-led stronger coalition among elites. Mineral economy is more likely to have more heterogeneous elites, which give the more chance of democratization (agri).
- H3a: The stronger the state's encapsulation of labor, the little chance of democratization or breakdown. (labencap)
- H3b: Radical mass parties more frequently in the mineral economy have the positive effect on democratization, while clientelistic parties more frequently in the agricultural economy have the positive effect on breakdown. (But, RSS added, radical mass parties might lead dominant classes to support the breakdown, paradoxically. (agent)
- H3c: Urbanization brings about the increase in working classes and middle classes. The higher urban population (urban), the more chance of social pressure towards democracy.

- H3d: Authoritarianism is sustained under one dominant political party, but the increase in the competition among parties enhances the chance of democratization, given that the prerequisite for protection of elite interests was the existence of more than two strong competing parties. (party)
- H4a: the higher the economy's openness given the overall heavy reliance on export and ISI, the more chance of breakdown because elites try to protect their interests by appealing to authoritarianism. However, economic vulnerability might bring about social pressure towards democratization (openk)
- H4b: Countries in the semi-peripheral position are more favorable to democratization compared to countries in the peripheral position (worldp).

# Some Preliminary Results...

## Overall trend of democratization in Latin America (1970-1995)



# Sequence of democratization(D) and breakdown(B)

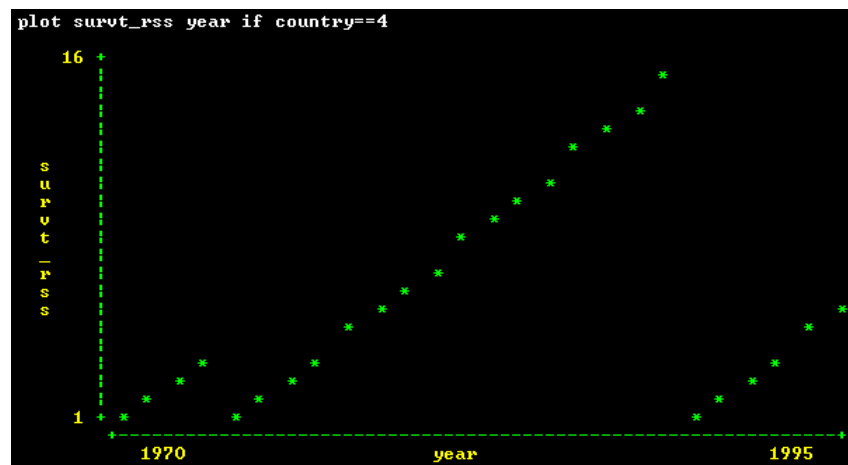
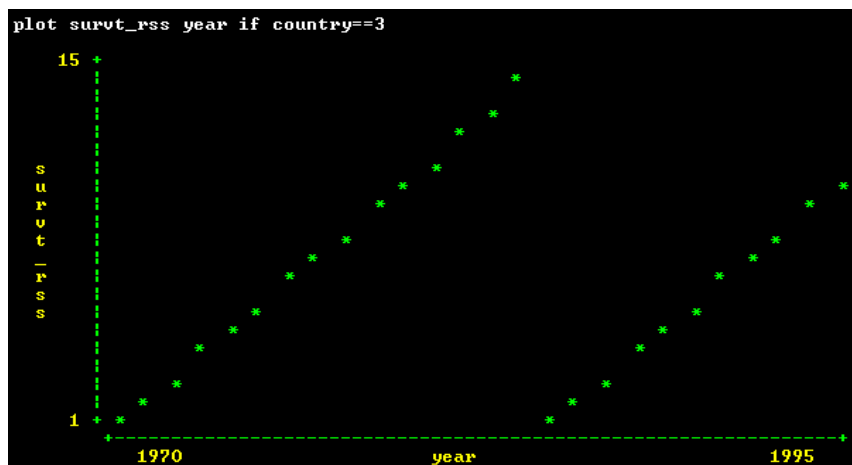
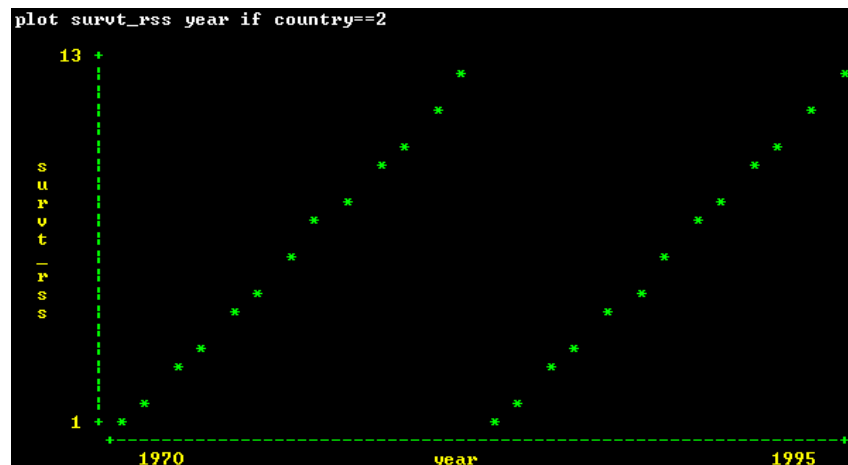
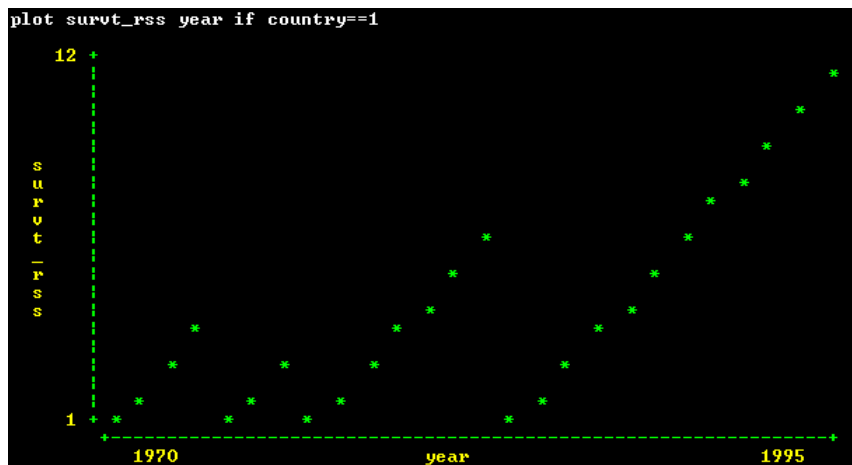
Pattern	Sequence	Countries
2>4>2>4	D>B>D	Argentina
1>3	D	Bolivia, Ecuador
2>3	D	Brazil
4>2>3	B>D	Chile
3	Censored	Colombia
1	Censored	Paraguay
1>4	D	Peru
4>2>4	B>D	Uruguay
4	Censored	Venezuela

# Which country is the most stable and unstable?

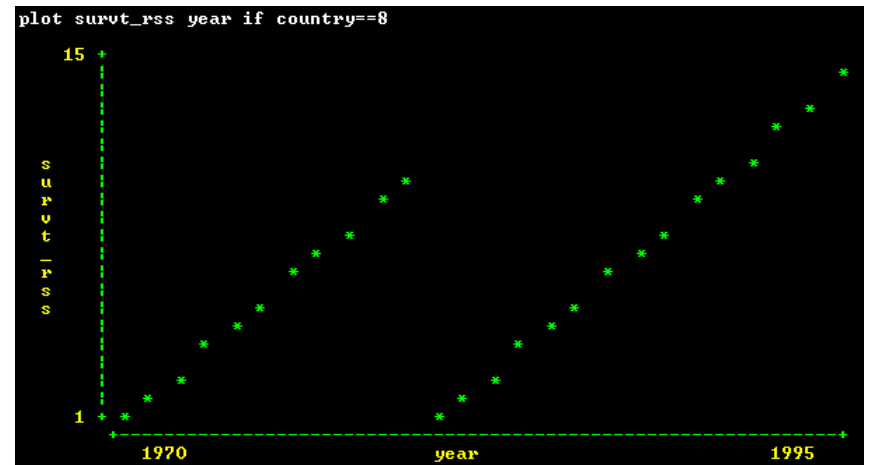
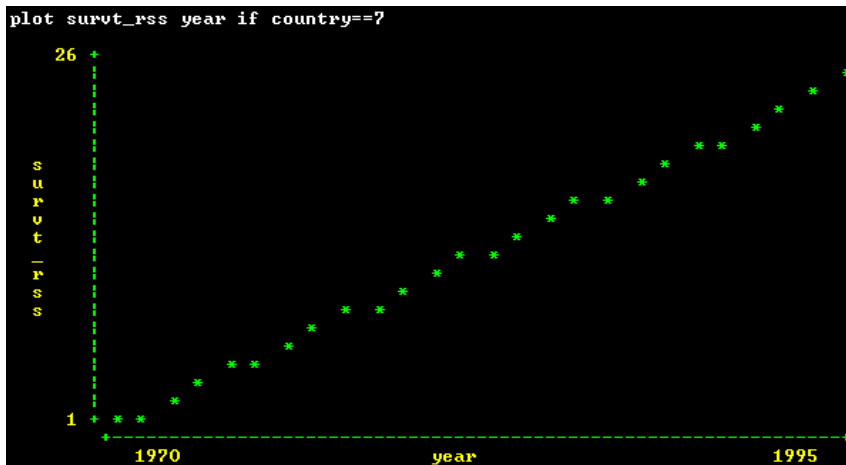
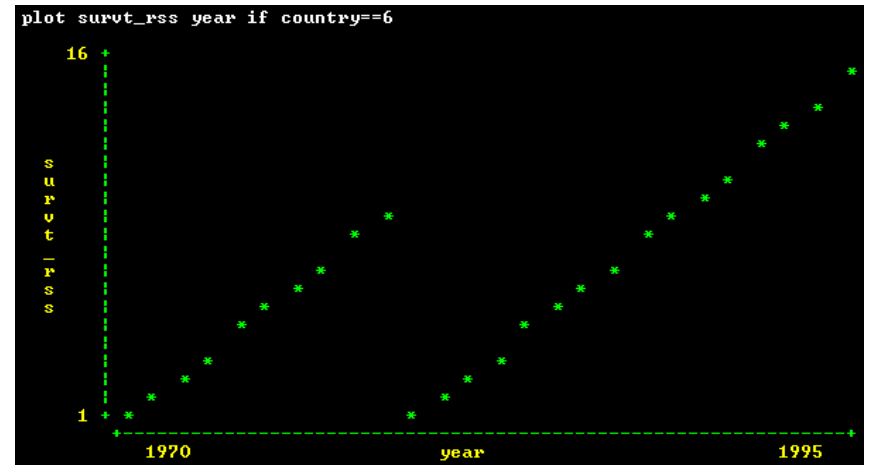
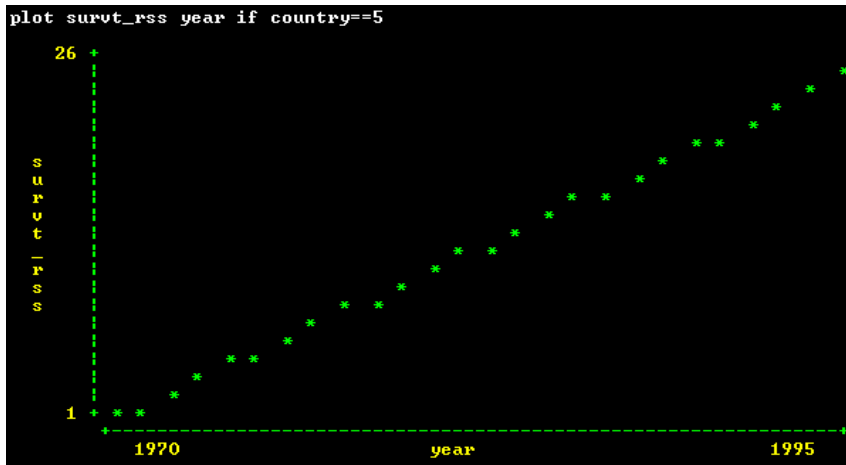
	Mean	Std.dev	Min	Max
Argentina	4.7	3.2	1	12
Bolivia	7	3.8	1	13
Brazil	7.2	4.1	1	15
Chile	6.4	4.7	1	16
Colombia	13.5	7.6	1	26
Ecuador	7.4	4.4	1	16
Paraguay	13.5	7.6	1	26
Peru	7.2	4.1	1	15
Uruguay	5.5	3.3	1	12
Venezuela	13.5	7.6	1	26

\* The average of survival time = 8.6 years

# The trend of survival time (1/2/3/4)



# The trend of survival time (5/6/7/8)



# The trend of survival time (9/10)

