THE EVOLUTION OF STATES:
THE LIMITS OF THEIR DIVERSITY

Svetlana Kirdina-Chandler,
Institute of Economics,
Russian Academy of Sciences, Moscow, Russia

Motivation

The aim of the paper is to justify theoretically, and prove empirically, the following thesis:

"Despite the complexity of socio-economic systems, the directions of their evolution can be predicted and the limits (in certain respects) of their diversity can be identified."

Outline

- Main Research Hypothesis

- Level of Analysis: Meso Level

- Subject of Analysis: Institutional Structures as a Combination of X and Y-matrices

- Investigated Factor: Geography

- Object of Analysis: Groups of States with Different Combinations of X- and Y-matrices

- Methodology: Data Mining Analysis

- Results of Statistical Research: Hypothesis was Confirmed

- Conclusion and Discussion

Main Research Hypothesis

- At the meso level of analysis the geographical characteristics are predominant factors leading to the formation of the main features of institutional structures prevailing in modern states.

- It gives us the possibility, despite the complexity of socio-economic systems present in modern states, to predict the direction of the evolution of institutional structures and identify the limits of possible institutional diversity.

Level of Analysis:
Meso Level

Why meso level analysis?

- The dissatisfaction with the traditional micro-macro dichotomy, which does not take into account the growing complexity of economies.

- The recent dissemination in the scientific discourse of the evolutionary and Institutional methodology for analysis of complex social and economic systems. In this case the dynamic evolving structures of the meso level, which ensure interconnected development of the economy, are at the centre of consideration.

Meso level analysis in Neoclassical Economics

- Meso level analysis, as found in Neoclassical Economics (NE), is based on Micro-Foundations (MF) and the Methodological Individualism Principle (MIP).

- The idea behind MF and MIP is to build a universal economic theory based on one set of assumptions. The neoclassical synthesis, as well as the new neoclassical synthesis, show that it is possible.

Why the NE perspective is not enough to investigate the meso level?

- The wholeness of economic systems is ignored.

- Factors which are beyond the rationality (bounded rationality) of economic actors are often not considered.

- Economic models based on MF do not contain anything that would distinguish market economies from economies of the Soviet type or from the economy of ancient Rome and medieval China" (Baumol, 2001, p.84)

Meso level Analysis in Heterodox Economics (HE)

- The essence of the heterodox approach is that the meso level is viewed as the result of self-organisation of social and economic complex systems in certain material and cultural conditions.

- The meso level of the economy is formed by the structures of interrelations, and the rules for the joint functioning of the constituent parts of social and economic systems. Institutions are the main focus of analysis.

Subject of Analysis:

Institutional Structures as Combinations of X and Y-matrices
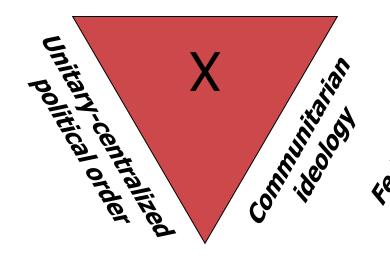
Institutions as meso level structures in HE

- Institutions are formal and informal routinised rules of social relationships.

- Not only behavioral characteristics but geography, culture and social embeddedness (in Karl Polanyi's sense) are important factors in their formation.

- "Longevity' of institutions makes it possible to classify social and economic systems in accordance with them. Polanyi presented an idea that economies based on market institutions, and economies based on redistributive institutions, coexist in space and time (*Polanyi*, 1977).

Institutional Matrices Theory (IMT) as an Extension of Karl Polanyi's Hypothesis

- **First publication in Russian**: *Кирдина С. Г.* 2000. Институциональные матрицы и развитие России. Москва: ТЕИС

- **Recent publications in Russian:** *Кирдина С. Г.* 2014. Институциональные матрицы и развитие России. Введение в X-Y-теорию. Изд. 3-е. М., С-Пб: Нестор-История; Кирдина С.Г., Кузнецова А.Н., Сенько О. В. 2015. Климат и институциональные матрицы // СОЦИС, № 9. С. 3-13. *Кирдина-Чэндлер С.Г., Маевский В.И.* 2017. Методологические вопросы анализа мезоуровня в экономике. // Journal of Institutional Studies. Том 9. № 3. С. 7-23.

- **First Publication in English:** Kirdina S. 2001. Fundamental Difference in the Transformation Process between Russai and East European Countries // Berliner Osteuropa Info, No. 16.

- **Recent publications in English**: Kirdina, Svetlana. 2013. New Systemic Institutional Approach for Comparative Political and Economic Analysis //Review of Radical Political Economics. 45(3):341-348; *Kirdina-Chandler S.* 2017. Institutional Matrices Theory, or X-and Y-theory: A Response to F. Gregory Hayden // Journal of Economic Issues. Vol. 51. № 2. Pp. 476-485.

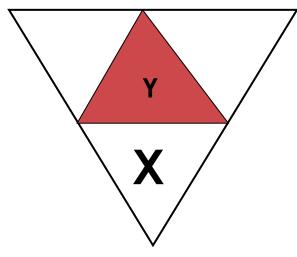(see more on website www.kirdina.ru)

Redistributive economy

Unitary-centralized political order

X

Communitarian ideology

Federative political order
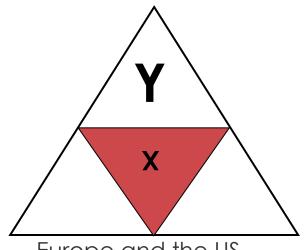
Y

Individualistic ideology

Market economy

* Redistributive economy

* Unitary-centralized political order
  (top-down model)

* Communitarian ideology (We over Me)

* Exchange economy

* Federative political order
  (bottom-up model)

* Individualistic ideology (I over We)

Countries classified by their predominant institutional matrix

Russia, China, India,

most Asian, Middle Eastern,

Latin American and others

(X-matrix predominates)

Europe and the US,

Canada, Australia,

New Zealand and others

(Y-matrix predominates)

Investigated Factor:
Geography

Geographical Hypothesis in Neoclassical Institutional Economics - discussion in the National Bureau of Economic Research in the US, 2000s

«Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development» (Rodrik at al., 2002)
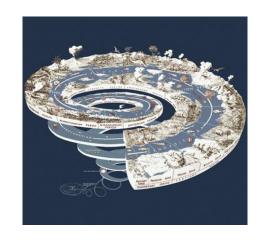

«**Institutions Don't Rule: Direct Effects of Geography on Per Capita Income»** (Sachs, 2003)

How Heterodox Economics contributes to the Geographical Hypothesis? - 1

- First, HE is characterized by active interaction between social and natural sciences, as well as more general and wider **interdisciplinarity**. The last is increasingly recognised as a necessary condition for discovering new fundamental knowledge.

- Second, HE pays more attention to the meso- and macro-levels rather than the micro-level. It is concerned with **institutions, history, and social structures** in comparison with the rationality-individualism-equilibrium nexus of mainstream economics (Davis, 2006, p. 57). Accordingly, the analytical element of heterodox research is based mostly, not on the premises of methodological individualism, but on the basis of holism and *methodological institutionalism* (Kirdina, 2015).

How Heterodox Economics contributes to the Geographical Hypothesis? - 2

- Third, the **_path dependence_** effect is important. It means that "where we go next depends not only on where we are now, but also upon where we have been" (Liebowitz, Margolis, 2000, 981). We are able to correct a historically chosen path and institutions but are unable to fundamentally change them. As Bellaïche said, "the phenomenon of dependence on history might be ignored for short periods of time (10 years, 20 years) but is not negligible for secular comparisons" (Bellaïche, 2010, 178).

How Heterodox Economics contributes to the Geographical Hypothesis? - 3

- Fourth, HE includes **the category of time** in any analysis. So evolution and long-term historical horizons become focuses of attention.
- Fifth, HE studies tend to overcome the gap between social and economic processes and the environment. In neoclassical mainstream economics, theory and spatial economics are separated. In the HE environment, geography and climate are also the subject of analysis. Such new research areas as Eco-economics, Green economics or Resource-based economics are examples. We can say that **Geography becomes a real actor** or *dramatis persona* in HE analysis.

Object of Analysis:

Group of States with Different Combinations of X- and Y-matrices

Full and reference samples of states

- The full sample comprised 65 countries (big enough: population > 5 million people and area > 30 000 km^2; independent political history > 55 years).

- From them a reference sample of 27 countries was identified. It comprised countries for which there was an experts' consensus that they were clearly X- or Y- matrix countries (X-countries =14: Brazil, Egypt, North Korea, China, Cuba, Laos, Mexico, Myanmar, Nepal, Peru, Republic of Korea, Russian Federation, Philippines, Japan; Y-countries = 13: Austria, Belgium, United Kingdom, Denmark, Germany, Spain, Italy, Netherlands, Norway, USA, Finland, France, Sweden).

Methodology:
Data Mining Analysis

Data

- A wide range of geographic indicators (more than 150) was used.

- Data bases used: www.worldbank.org; www.cia.gov; www.gapminder.org; http://faostat3.fao.org; http://www.indexmundi.com; http://en.wikipedia.org; http://unstats.un.org; http://www.world-nuclear.org; http://www.bp.com; http://minerals.usgs.gov.

Data mining analysis

- Patterns for the identification of measurable differences between groups of countries based on permutation tests was used. Data mining procedures and original methods of classification allowed us to identify the non-linear character of the relationship between the investigated parameters. (L. Kirilyuk, A. V. Kuznetsova, O. V. Sen'ko, A. M. Morozov. Method for detecting significant patterns in panel data analysis.//Pattern recognition and Image Analysis. January 2017, Volume 27 (1). Pp 94–104)

- From among more than 150 geographical indicators 26 indicators (mainly climatic) were identified which statistically differentiated the 27 countries into the X or Y group.

- This differentiation (based on the 26 indicators) was confirmed as applying to the full sample =65 countries.

Results of Statistical Research:

Hypothesis was Confirmed

Geography distinguishes the X- and Y-countries

- Geographic parameters that differed significantly between countries with dominating X or Y matrices were identified:

  - Air temperatures

  - Precipitation average

  - Consequences of natural hazards (droughts, floods, earthquakes, extreme temperatures etc)

- Two groups of so-called "hot" and "cold" X-countries, and a group of Y-countries occupying a "middle position" between the two X groups, were identified.

Indicators	«Cold» X-countries	Y-countries	«Hot» X-countries	Fisher test
Affected by natural hazards, %	1.9	0.1	1.3	0,0040
t° C Annual average	6.4	9.3	23.1	<0,0001
t°C min in Year	1.0	4.6	17.4	<0,0001
t °C October	8.1	9.8	23.6	<0,0001
t°C_November	0.4	5.4	21.4	<0,0001
t°C_December	-5.6	2.2	19.4	<0,0001
t°C January	-8.2	0.9	18.8	<0,0001
t°C February	-6.2	1.9	19.9	<0,0001
t°C March	0	4.5	21.7	<0,0001
t°C April	6.6	7.8	23.6	<0,0001
t°C May	12.3	11.7	24.9	<0,0001
t°C June	16.7	14.8	25.7	<0,0001
t°C July	19.6	16.9	25.8	<0,0001
t°C_August	19.3	16.6	25.8	<0,0001
t°C September	14.7	13.9	25.2	<0,0001
Precipitation, mm May	87	57	120	0,0039
Precipitation, mm June	146	60	142	0,0050
Precipitation, mm July	219	57	145	0,0003
Precipitation, mm August	194	57	146	0,0006
Precipitation, mm September	131	55	141	0,0017
Precipitation, mm October	62	61	134	0,0019
Precipitation, mm Annual	1100	760	1328	0,0090
Precipitation, mm Amplitude	194	52	159	<0.0001

«Cold» X-countries	Y-countries	«Hot» X-countries

	«Cold» X-countries	Y-countries	«Hot» X-countries
t°C average	6.4	9.3	23.1
t°C minimum	1.0	4.6	17.4

«Cold» X-countries	Y-countries	«Hot» X-countries

	«Cold» X-countries	Y-countries	«Hot» X-countries
Annual precipitation, mm	100	760	1328
Amplitude of precipitation (Max - Min), mm	194	52	159

Population affected by natural hazards, %

«Cold» X-countries   1.9

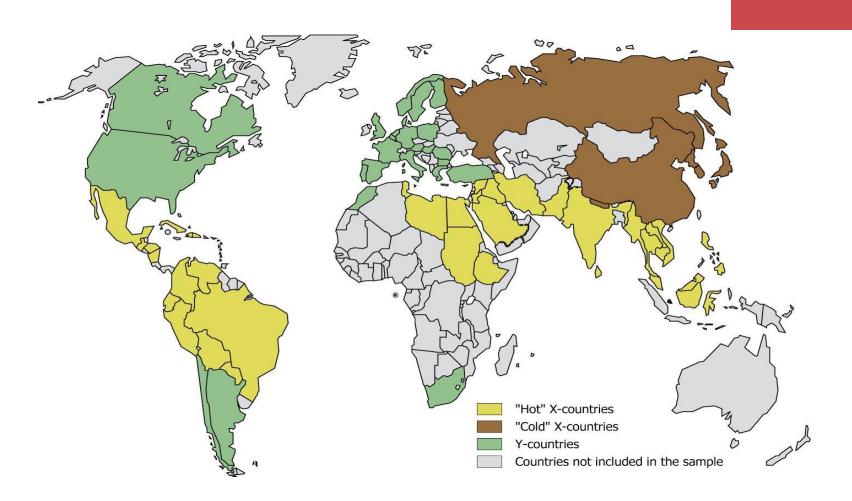**Y-countries   0.1**

«Hot» X-countries   1.3

Y-countries (25)
Austria, Argentina,
Belgium,
Bulgaria,
United Kingdom,
Hungary,
Denmark, Germany, Greece,
Spain, Italy,
Canada, Morocco,
Netherlands,
Norway,
Poland, Portugal,
Romania, the United States,
Turkey, Finland,
France, Sweden
Chile,
South African
Republic

«Hot»
X-countries (34)
Bolivia, Brazil, Venezuela,
Vietnam, Guatemala,
Honduras,
Dominican Republic,
Egypt, India,
Indonesia,
Jordan, Iraq, Iran,
Cambodia, Colombia,
Cuba, Laos, Libya,
Malaysia,
Mexico, Myanmar,
Nicaragua, Pakistan,
Paraguay, Peru,
Saudi Arabia, Syria,
Sudan, Thailand, Tunisia,
Philippines, Sri Lanka,
Ecuador, Ethiopia

«Cold»
X-countries (6)
China, North Korea, Nepal,
the Republic of Korea,
Russia, Japan

Countries' allocation

"Hot" X-countries
"Cold" X-countries
Y-countries
Countries not included in the sample

The revealed pattern

- **A *mixed method*** was used combining qualitative and quantitative analysis to investigate the role of geographical environments on institutional development in different countries.

- In countries with relatively soft climate characteristics (**optimal air temperatures and precipitation**) as well as lower natural hazards, the results showed that the so-called **Y-matrix** institutions historically prevail.

- In countries where air temperatures are relatively **hot or cold**, levels of precipitation are relatively **high or low,** and natural hazards are **quite high**, the results showed that so-called **X-matrix institutions** historically predominate. Both conclusions were logically justified and statistically confirmed.
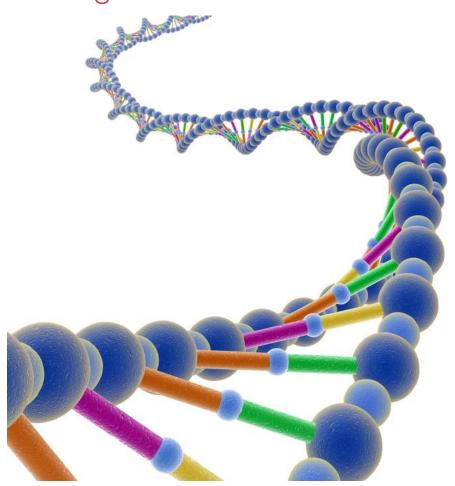
Logical justification - 1

- **The history of any state begins with the stage of settled agricultural production,** for which climate plays a determining role. Societies can survive if they have learned to provide their population with sufficient food and protect it from environment hazards and variables. **Primary basic institutions ("social technologies") are being formed.**

- As Karl Polanyi pointed out "the social organization of appropriation of the surrounding energy and power ... determines the institutional matrix" (Polanyi, 1977: xxxii).

- History shows **that in different climatic zones, agriculture developed in different ways**. Examples of arid Egypt with centralized forms of farming and fertile Mesopotamia with its initial exchange forms of coordination are well-known examples.
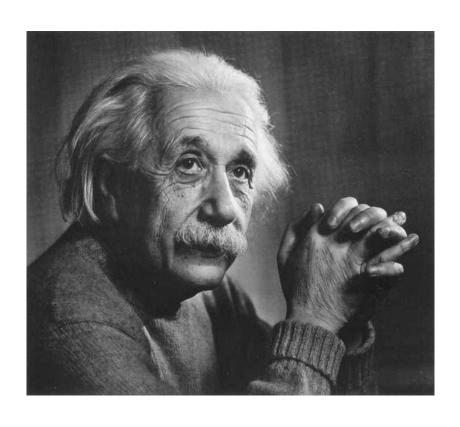
Logical justification - 2

- The transition from agrarian to industrial societies and the subsequent stages of social development did not abolish, but absorbed the institutional developments of previous eras. The mechanisms of **cumulative causality** (T. Veblen), **path dependence** (P. David, P. Pierson, S. Leibovitz, S. Margolis, etc.), block-in effects (D. North), **socio-cultural evolution** (J.E. and G. Lensky), and the approach of "**an ecological interpretation of history**" (A. Leopold), and the like, provided the basis for the transmission of social technologies and supported the dominant position of the particular institutional matrix, that arose at the dawn of the history of the state.

The irreversibility (one-way direction) of Time's Arrow by Arthur Eddington does not allow the differences that have arisen in the previous stages of social development to be ignored.

Is it a too strong simplification or… ?

- «…the simpler our picture of the external world and the more facts it embraces, the more strongly it reflects in our minds the harmony of the universe'' (Einstein, Albert and Leopold Infeld. 1938. *The Evolution of Physics*. Cambridge: Cambridge University Press. P. 225).

Conclusion and Discussion - 1

- Emerging heterodox economics **(HE)**, which go beyond the limitations of the methodological prerequisites of mainstream economic thought, **contribute new ideas to the discussion "geography versus institutions**". It focuses on the study of evolutionary processes and the development of economic phenomena from the long-term historical perspective. As part of this HE seeks to build a bridge between, on the one hand, the study of social and economic processes and, on the other hand, the environment in which they are carried out. Therefore, the environment, climate and geography became topics of study in HE.

- The paper shows **that for the analysis of long-term economic evolution 'geography matters**'. This conclusion is confirmed by the results of empirical studies carried out in Russia and worldwide since the early 2000's.

Conclusion and Discussion - 2

- In countries with relatively soft and moderate climate characteristics so-called **Y-matrix institutions** historically prevail. In countries with more extreme climate and natural hazards so-called **X-matrix** institutions historically predominate. Conclusions were **logically justified and statistically confirmed.**

- It is useful to take into account the influence of geographic conditions in institutional design and economic policy and **recognize the limitations** connected with the predominant position of any particular institutional matrix.

- To determine **the optimal proportion** of predominant and complementary institutions is one of the main tasks for "institutional designers".

Thank you for your attention!

www.kirdina.ru
www.кирдина.рф

kirdina777@gmail.com