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Power as a structuring concept for political economy

Algorithmic evolutionary methods in action

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Abstract: *The talk explores the concept of power and uses it to provide a new foundation for a conceptual framework of evolutionary political economy. This framework makes excessive use of the perspective of agent based simulation to keep all new notions clear, concise, and consistent. The artificial political economy is considered as a tribal society. The tribes' chieftains are involved in a game of power and exploit their farmers dependent on their chosen strategies. The model combines elements of a stock-flow consistent architecture of capital reproduction cycles, of agent-based bottom-up mechanisms and of evolutionary group-selection on a network topology.*

Keywords: evolutionary political economy, power, capital stock-flow circulation, agent-based modeling, group-selection on a network

Extended Abstract:

As the object of investigation to start with an artefact called a 'tribe' – describing a hierarchical set of heterogeneous human individuals – is chosen. A tribe is structured in both directions: internally it consists of a structure of its members (farmers and a chieftain either warrior or priest) which endogenously influences its behaviour; externally it is one of many interacting tribes and gets endogenously influenced by the interaction of all tribes. Since neither a smallest possible entity nor a largest possible entity is exogenously assumed this setting allows for a full use of self-similarity – as needed by the field of application of this methodological approach. Internalized power – understood as ideology – is enforced by priests, which enable certain sets of internal farmer models, dependent on the economic input-output structure with regards to its production technology. They influence the operant rule structure of their tribe and consequently the path-dependency (stabilisation and de-stabilisation) of internal farmer models (priest-farmer link). Externalized power is realized within an institutionalization process between tribes. Tribes are connected through chieftains, which are responsible on the one hand for inner coercive power (warrior-farmer or priest-farmer link) and on the other hand for conflict exaggeration and resolution between tribes (warrior-warrior, warrior-priest and priest-priest links). This double character of power shapes the circular cumulative causation (history with feedback) of our artificial political economy, which allows for an evolutionary process with possible structural revolutionary breaks as wells as gradual continuity.

Tribes are initialized with a random level of production layers. On each layer a farmer-node is created with a uniform distributed capital stock. The model represents a stock-flow consistent setup of a one-good world, where farmers deliver the amount of goods forward to the next production layer in dependence on their technological capital-production ratio. The last farmer node delivers the final flow of goods to the chieftain, who is accumulating wealth. The capital-production ratio is conceived as a transportation technology, which gets endogenized via the chieftains. All chieftains are initially connected with each other and play an iterated chicken game on a network topology of a directed graph. Their links are weighted with a force, representing the mutual trust between them. Their neighbourhood is associated with a satisfaction factor, dependent on past cooperation and defection. If satisfaction is rather low chieftains tend to disconnect from other chieftains with the lowest mutual trust (force) and reconnect with other nodes, recommended from their neighbours. Crucial element of the model is a relative power measure, responsible for coercive (external) or ideological (internal) power. The chieftain with the greatest wealth receives maximum power of 1, all other power values are calculated as the ratio of their power to the most powerful. This power value is then integrated into the link-updating rule, so that powerful chieftains are no likely to connect with less powerful and low power chieftains are looking forward to connect with more powerful chieftains. Of course this link-updating mechanism is dependent on the previously chosen strategy of either hawk or dove.

Warriors play hawk and are able to invest in weapon technology. If investment is feasible they are attacking foreign connected tribes. Dependent on their power values the attack is either successful or not. A successful attack leads to a robbery of foreign transportation technology (think of stealing simple transportation wagons for instance). Warriors equip their farmers with this new technology and are able to exploit capital faster than before. Farmers also receive a proportional amount of the warrior's loot. Priests play dove strategy and are able to invest in innovation to enhance their transportation technology on their own. A successful innovation leads to a better transportation technology, updating the farmers' capital-production ratio in the same way as it is conducted in warrior led tribes. Since innovation is more costly, this more hostile method is slower than the coercive one. Chieftains change their strategy if their relative power value falls close to zero. On the other side a tribe is wiped out if the total capital stock of a tribe's farmers also decreases below zero.

First simulation runs have shown the following preliminary results: (1) The initial number of production layers has a path-dependent effect on the flow of goods. Small tribes with few layers have an advantage in the short-run, because they are able to accumulate capital fast and efficient, but in the long-run they are getting vulnerable to attacks and punctuated structural breaks in the overall power distribution; if a tribe is wiped out for instance and power relations need to get diced again in consequence. (2) Warrior led tribes are exploiting their farmers faster than priest led tribes and may also die out faster. Nevertheless they are able to succeed faster if they have a high success rate of their attacks in the short-run, since

priest-led tribes are easier to attack. Priest led tribes are able to engage in a more 'sustainable' type of production, where exploitation of farmers is rather low. (3) The group selection mechanism embedded in the network evolution allows priests to protect themselves in 'priest-tribe-cliques' in front of defecting warriors, whereas warriors act as 'lone-wolfs' using their high relative power as a first-mover strategic advantage. This notion delivers two basic stable outcomes, on the one hand a surviving priest clique of tribes and on the other hand just one surviving warrior tribe.

About the Authors

Gerhard Hanappi is ad personam Jean Monnet Chair for Political Economy of European Political Economy. He is a senior researcher at the Technical University of Vienna – Research Group Economics and has been the project leader of numerous projects in this area as well as author of approximately 200 research papers. His expertise in team leadership and his international experience manifested in his four years executive directorship at the Austrian Academy of Sciences (soocioeconomics unit) and his directorship (scientific and administrative) of the Ludwig Boltzmann-Institute for Monetary Economics; in the first half of 2011 he was visiting professor at the University of London (SOAS).

Manuel Wäckerle is an evolutionary economist focusing on institutional change and political economy of Europe, working as a Post-Doc at the Technical University of Vienna – Research Group Economics. He obtained his PhD in 2010 in economics and computer science also at the Vienna University of Technology. Manuel's recent research focuses on the crisis of the Eurozone, central bank evolution and the evolution of credit-rules. Other main research areas of interest to him belong to the realms of the history of economic thought; the interdisciplinary field between institutions, innovation, technological change and exploitation of nature; and the political economic and philosophical domain of democracy and governmentality. Manuel is using new formal methods such as agent-based modeling and social network analysis to understand the generic characteristics of systemic risk, stability and fragility with regards to the interconnection between the economic, the social, the political and the ecological.