



# Institutional Endowments and the Lithuanian Holding as Innovative Network: A Problem of Institutional Compatibility in the Baltic Sea Area

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**Abstract.** Post-socialist Lithuania had an undeveloped banking, a weak network commitment, and a resilient *nomenklatura*. An evolutionary Crossroads game shows that this made the *nomenklatura* bank convention stronger than the capitalist bank convention. In the *nomenklatura* bank convention, rent-seeking behavior decreases network commitment and thereby the effect of network complexity, thus making learning-by-financing weaker. This created a problem of institutional compatibility of bank-industry networks in the Baltic Sea Area during Lithuania's first voucher stage of privatization that might be overcome by foreign direct investment initiated in her second hard currency stage.

**Key Words:** bank-industry networks, post-socialist holding companies, corporate governance, conventions, evolutionary game theory, Lithuania, Sweden, Baltic Sea Area

**JEL classification:** G30, O12, P51

## 1. Introduction

Economic integration of the Baltic Sea Area raises issues of institutional compatibility of Hayek's (1978) discovery procedure between diverse social orders. Within the Baltic Sea Area, a comparative institutional analysis between Sweden, a market economy, and Lithuania, an emerging market economy, or transition economy, is of particular interest. By July 1, 1999, Sweden was the largest foreign investor in Lithuania, followed by the USA, Finland, Denmark, and Germany (OECD 2000). The issue, here, is the integration between market economies and emerging market economies rather than a casual comparison of transition economies, e.g. the Baltic states. This implies a comparative analysis of two historically specific cases. Hence, a model applied to analyze the evolution of economic institutions of Sweden may have to be modified to analyze the evolution of economic institutions of Lithuania. A comparison between Lithuanian and Swedish bank-industry networks will be considered from this perspective.

The voucher privatization in Lithuania between 1991 and 1995, led to the evolution of investment funds, where people invested their vouchers for shares in those funds (Mygind

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1999). From those funds, a few large post-socialist holding companies, backed by commercial banks under their control, emerged as strategic owners, sometimes controlling entire industries, e.g. electronics (Hirschhausen and Hui 1995, EBRD 1997). By the end of 1998, when foreign capital had started playing an important role, most funds had been dissolved following the tightened regulation in the preceding year (Mygind 1999).

What was the outcome of the holding as economic institution? Favorization of insiders caused poor corporate governance, according to the World Bank (1998). Empirical results of Mygind (1999) suggest that domestic financial ownership had a great disadvantage compared to foreign ownership in terms of economic performance as well as a lower debt/equity ratio. The poor corporate governance reflects that the Lithuanian holding had insufficient capacity to function as an innovative bank-industry network, such as the Swedish ownership sphere or the Japanese keiretsu. In other words, the Lithuanian holding failed to become an innovative bank-industry network.

A bank-industry network evolves through a history of successful banker-entrepreneur interaction establishing durable links between the banker and a set of entrepreneurs as well as between the entrepreneurs based on a sequence of complementarities (Marmefelt 1998b). The sequence of complementarities forms a development block, where financiers coordinate entrepreneurial activities (Dahmén 1950, 1988). The function of the bank-industry network is learning-by-financing which reduces the information costs of the banker and the financing costs of the entrepreneur, thus increasing innovativeness (Marmefelt 1997, 1998a, 1998b). Hayek's (1978) competition as a discovery procedure, thus, becomes more efficient, leaving fewer unused opportunities. However, the Lithuanian holding might be functionally different from the Swedish ownership sphere. According to Radošević (1997), the holdings may develop into restructuring agents, but Hirschhausen and Hui (1998) consider the role of the holdings an open issue.

The ownership sphere is a bank-industry network, where a bank through an affiliated investment company has a stable ownership in the industrial firms, which are members of the network. The Swedish ownership spheres emerged during the industrial breakthrough between 1890 and 1920, in which Swedish banks were heavily involved (Nygren 1983, Lindgren 1990, Larsson and Lindgren 1992, Glete 1994). Banks financed entire development blocks, e.g. both users and producers of the engineering industry (Nygren 1983).

The argument presented here is that the institutional endowments, i.e. the initial set of institutions, matter for the spontaneous evolution of economic institutions of capitalism. The starting point is a historically evolved social contract rather than a state of nature without any institutions, so institutional evolution is path dependent. This historically evolved social contract is implicit and corresponds to Hayek's (1967, 1973) spontaneously emerged social order, based on both the innate, genetically inherited universal rules of human behavior and the learned, culturally transmitted rules of human conduct. For Lithuania, as a former Soviet economy and society, there is a path dependence of post-Soviet institutions on pre-Soviet institutions, not only on Soviet institutions. As Nørgaard and Johannsen (1999) argue, the interwar period functions as a frame of reference when forming strategies to overcome the fundamental barriers to pluralistic democracy and market economy created during the Soviet period.

Marmefelt (1997, 1998b) explains the evolution of bank-industry networks, i.e. ownership spheres, in Sweden as spontaneous, because Sweden had sufficient institutional endowments of a developed banking system and network commitment in contrast to France, where collective action was required due to insufficient network commitment.

The purpose of this paper is to analyze a developed banking system, network commitment, and a resilient *nomenklatura* as institutional endowments of Lithuania in order to develop a model, where institutions are considered as spontaneously emerged orders, in the sense of Hayek (1967, 1973, 1976, 1979), that explains how the evolution of the Lithuanian holding differs from the one of the Swedish ownership sphere and the implications for the institutional compatibility of Hayek's (1978) discovery procedure between bank-industry networks in the Baltic Sea Area. Is the function of Lithuanian bank-industry networks learning-by-financing or rent-seeking? By answering that question a plausible explanation why the Lithuanian holding failed to become an innovative bank-industry network, thus indicating a problem of institutional compatibility between bank-industry networks in the Baltic Sea Area due to diverse social orders, is presented.

This explanation is related to the view of the Soviet economy as a neomercantilist pattern of providing monopoly and privileges to favored groups and individuals, whose foundations developed during the half-century preceding the Russian Revolution (Anderson and Boettke 1996, Boettke 2001). The Soviet economy was imposed on Lithuania by coercion, but when this ended with her regained independence, the pre-Soviet, interwar institutional endowments became important for the viability of the *nomenklatura*, as a Soviet institutional endowment. Another plausible explanation is that formal rules, which enforce property rights and contracts, are lacking, thus preventing economic calculation (Mises 1920, 1949) and a culture of reciprocal exchange (Buchanan 1997).

In my view, these two explanations are complementary, because there is an inverse relationship between the viability of the *nomenklatura* and the effectiveness of the rule of law. As Hayek (1976) argues, the extended market order depends on the evolution of codes of personal conduct that restrict opportunistic behavior. Rules are rules only if customary practice dictates (Boettke 1996, 2001). Consequently, I argue that neomercantilist norms provide for a viable *nomenklatura* that prevents the effective rule of law, thus maintaining the evolutionary viability of the neomercantilist norms, until they become too costly in terms of preventing human action to reach sufficiently satisfactory states, in the sense of Mises (1949), compared to the costs of establishing an effective rule of law.

Section 2 presents the integrated theoretical-historical approach to bank-industry networks in Marmefelt (1997, 1998a, 1998b), while Section 3 assesses the Lithuanian holding as bank-industry network. The two following sections are a historical analysis aimed at providing some stylized facts about Lithuania in order to identify path dependencies. Section 4 analyzes Lithuania's post-socialist economic development in the light of her pre-socialist, interwar frame of reference, while Section 5 brings in the political dimension and the development of Lithuanian society. Based on the stylized facts provided, Section 6 is a game-theoretic analysis of the Hayekian discovery procedure and the evolution of the holding. This leads to the conclusions in Section 7.

## 2. A Theoretical-Historical Approach to Bank-Industry Networks<sup>1</sup>

Learning-by-financing is the function upon which the bank-industry network is founded. Banks have an advantage as information producers concerning their client firms (Campbell and Kracaw 1980, Diamond 1984, Fama 1985), because banks have private information, while investors in corporate bonds only have public information (MacKie-Mason 1989, Sharpe 1990). If banker-entrepreneur interaction is institutionalized in a bank-industry network, based on mutual trust and network commitment, then the banker may produce private information through learning-by-financing. My concept learning-by-financing is conceptually related to Arrow's (1962) learning-by-doing and Lundberg's (1961) Horndal effect, because the output of financial information increases for the same input of human capital in banking. This reduces information costs of the banker and financing costs of the entrepreneur. The private information is an outcome of a continuous interaction in a durable relationship between banker and entrepreneur. Banks may informationally capture high quality firms through a history of information production at low cost (Fama 1985, Sharpe 1990). Learning-by-financing implies a capacity to keep information asymmetries low by adapting to change. Lock-in (David 1985, Arthur 1988) into previously successful choices is avoided, as long as learning-by-financing remains efficient. Networks create a critical mass of adopters rather than lock-in, along the lines of Witt (1997).

Following Langlois and Robertson (1995), networks are business institutions, which reduce dynamic transaction costs of economic change to the extent that they solve Co-ordination problems rather than Prisoners' Dilemma problems under genuine uncertainty. Bank-industry networks evolve through a history of successful banker-entrepreneur interaction establishing durable links between bankers and entrepreneurs. Network commitment provides the social capital, which is necessary to create durable interpersonal links through social interaction.

Social capital, which is embodied in social relations, may contribute to the formation of human capital (Coleman 1988). Trust reduces conflicts (Granovetter 1985) and uncertainty (Whitley 1992). Economic behavior is embedded in social relations, which generate trust (Granovetter 1985). Historically evolved mutual trust decreases transaction costs (Lundvall 1991). According to Fukuyama (1995), Japan is a high-trust society, which reduces transaction costs. The Japanese keiretsu is a business group of interdependent firms, not a hierarchical business group, such as the South Korean chaebol (Granovetter 1995). Commitment and loyalty facilitate information sharing (Whitley 1990). Collective loyalties were a prerequisite for peace during the Tokugawa Shogunate (Whitley 1992). Hence, network commitment based on collective loyalty has been an institutional endowment of Japanese society.

According to Etzioni (1988), moral values decrease decision making costs. An explanation is provided by Frank (1988) who argues that moral sentiment induces commitment. Network commitment is a moral commitment rule, which represents what Sugden (1991) calls a resolute behavior of pragmatic rationality. Network commitment provides the social capital, which is necessary to create durable interpersonal links through social interaction. Aoki (1988) points at the rationality of Japanese institutions, which combine decentralized information processing with centralized incentive structures. Marmefelt (1998b) considers

moral commitment in a bank-industry network rational, because dynamic transaction costs become lower, thus increasing the value of information.

Analyzing Schumpeterian banker-entrepreneur interaction as an evolutionary Stag Hunt game, Marmefelt (1997, 1998a, 1998b) provides a functionalist-evolutionary explanation why bank-industry networks exist in a world with uncertainty and bounded rationality. The Stag Hunt game implies that the banker and the entrepreneur would be better off by cooperating in a bank-industry network, but only if both of them do so. They may individually catch rabbits, but they would all be better off if, and only if, they cooperate to hunt a stag.

Marmefelt (1998b) shows how learning-by-financing in bank-industry networks may increase innovativeness, because resource allocation improves and the costs of knowledge capital decrease, thus allowing for higher quality increments and lower entry costs. Consequently, the Stag Hunt game is justified, since bankers and entrepreneurs may be better off by cooperating in a bank-industry network. Learning-by-financing is the function upon which the bank-industry networks are founded and their propagation mechanisms correspond to the two conjectures for analysis of the propagation process of economic institutions, identified by Witt (1989); the Smith-Menger-Hayek conjecture of spontaneous order and the Olson-Buchanan-Tullock conjecture of collective action.

Considering institutions as spontaneously emerged orders, in the sense of Hayek (1967, 1973, 1976, 1979), in a world with uncertainty and bounded rationality implies that an institution is a convention having emerged from a process of social interaction. Of relevance for this paper, Hayek's view on spontaneous order provides seven fundamental insights:

- (i) An institution is a self-generating, grown order, *kosmos*, not an organization, made order, *taxis*, which is an outcome of collective action.
- (ii) As a grown order, an institution is a suborder of the spontaneous order of society, capable of achieving any degree of complexity.
- (iii) An institution results from individuals following a certain rule of conduct which makes possible cooperation yielding efficient orders of action, in the sense of matching expectations, i.e. a rule of just conduct, *nomos*, not a rule of organization, *thesis*.
- (iv) The discovery of rules that command general assent provides the foundation of an institution, i.e. common values maintain each institution.
- (v) An institution is a rule, selected by a process of cultural evolution, as a means to deal with unknown contingencies.
- (vi) Institutions, as abstract rules of just conduct, provide together the foundation of catalaxy, the market order that reconciles the knowledge and purposes of different individuals and organizations.
- (vii) Mind exists as a part of an order, which persists and develops because many minds constantly absorb and modify parts of it, reflected in competition as a discovery procedure, thus making tradition, embedded in rules of just conduct, superior to reason, embedded in rules of organization, as foundation of progress.

Hayek's view, as formulated by these insights, can be represented by an evolutionary Stag Hunt game. Following Sugden (1986), the two evolutionary stable strategies of this game corresponds to the spontaneously evolved conventions of financing industrial innovations:

- (i) The bank convention institutionalizes banker-entrepreneur interaction within bank-industry networks, establishing a durable link between bankers and entrepreneurs. Learning-by-financing is thereby made possible, so the banker may develop private information. Hence, the bank convention implies private information for all financial instruments.
- (ii) The bond convention institutionalizes banker-entrepreneur interaction as a market contract, establishing a temporary link. There is no learning-by-financing, so the banker has to rely on public information available at the market, performing a monitoring function. Hence, the bond convention implies public information for all financial instruments.

Bankers and entrepreneurs play a two-person random pairing game between a member of the population of bankers and a member of the population of entrepreneurs. There are two strategies: strategy 1 being network-oriented and strategy 2 being independent-minded. The banker chooses either strategy 1 (informed) of being a network bank or strategy 2 (arm's length) of being an independent bank, behaving like a market investor in the latter case. Similarly, the entrepreneur chooses either strategy 1 (reliable) of staying within the network or strategy 2 (unreliable) of taking the credit as a temporary link with the banker. Set the payoffs of independent bankers and entrepreneurs to unity and let  $u > 1$  denote the payoff of the network banker and  $v > 1$  the payoff of the network entrepreneur. This gives the payoff matrix of the Stag Hunt game, as shown by Figure 1. Let  $p$  denote the proportion of bankers using strategy 1 (informed) in the population of bankers and  $q$  the proportion of entrepreneurs using strategy 1 (reliable) in the population of entrepreneurs. Then the population dynamics of the pair  $(p, q)$  represent the institutional dynamics of banker-entrepreneur interaction guiding the evolution of bank-industry networks.

Let us assume Malthusian dynamics, where the growth rate of a strategy is equal to its relative fitness. Hence, a strategy grows as long as its fitness is higher than the average fitness of the population (Friedman 1991). Therefore, the growth of informed bankers becomes:

$$\dot{p} = p(uq - 1)(1 - p), \quad (2.1)$$

and the growth of reliable entrepreneurs:

$$\dot{q} = q(vp - 1)(1 - q). \quad (2.2)$$

		Entrepreneur	
		1 (Reliable)	2 (Unreliable)
Banker	1 (Informed)	$u, v$	$0, 1$
	2 (Arm's length)	$1, 0$	$1, 1$

Figure 1. Banker-entrepreneur interaction as a Stag Hunt game.

Equation (2.1) shows that the proportion of informed bankers in the population of bankers is stable only when  $p = 0;1$  or  $q = 1/u$ . Similarly, Eq. (2.2) shows that the proportion of reliable entrepreneurs in the population of entrepreneurs is stable only when  $q = 0;1$  or  $p = 1/v$ . As shown by Friedman (1991), the evolutionary stable strategies of a game, whose population dynamics are given by a system of differential equations, can be identified through a local stability analysis of the Jacobian created by this system. The determinant of the Jacobian of the system of Eqs. (2.1) and (2.2) is:

$$\det J = (uq - 1)(1 - 2p)(vp - 1)(1 - 2q) - uvpq(1 - p)(1 - q), \quad (2.3)$$

while the trace of the Jacobian is:

$$\text{tr } J = (uq - 1)(1 - 2q) + (vp - 1)(1 - 2q). \quad (2.4)$$

The game converges to either the bank convention,  $(p = 1, q = 1)$ , or the bond convention,  $(p = 0, q = 0)$ , whose basins of attraction are separated by a saddle point,  $(p = 1/v, q = 1/u)$ .

**Proof:**  $(p = 1, q = 1)$  gives  $\det J = (u - 1)(v - 1) > 0$  and  $\text{tr } J = 2 - u - v < 0$ ,  $(p = 0, q = 0)$   $\det J = 1 > 0$  and  $\text{tr } J = -2 < 0$ , and  $(p = 1/v, q = 1/u)$   $\det J = -(1 - 1/v)(1 - 1/u) < 0$  and  $\text{tr } J = 0$ . Hence,  $(p = 1, q = 1)$  and  $(p = 0, q = 0)$  are evolutionary stable strategies and  $(p = 1/v, q = 1/u)$  is a saddle point.  $\square$

The basin of attraction of the bank convention increases when  $u$  and  $v$  increase, since the saddle point moves towards the bond convention. The network payoffs,  $u$  and  $v$ , are themselves dependent on the institutional endowments.

When the institutional endowments are insufficient,  $u$  and  $v$  may be too low to allow for a spontaneous evolution of bank-industry networks, since the basin of attraction of the bank convention is too small. Collective action, designing the bank-industry network as a fully privileged group, may solve this problem by transforming the payoff matrix to a Fully Privileged Stag Hunt game, as illustrated by Figure 2.

This payoff structure gives dynamic system of the evolution of network-oriented bankers and entrepreneurs:

$$\dot{p} = p(1 - p), \quad (2.5)$$

$$\dot{q} = q(1 - q). \quad (2.6)$$

		Entrepreneur	
		1 (Reliable)	2 (Unreliable)
Banker	1 (Informed)	2,2	0,1
	2 (Arm's length)	1,0	-1,-1

Figure 2. Banker-entrepreneur interaction as a Fully Privileged Stag Hunt game.

The system given by Eqs. (2.5) and (2.6) makes the bank convention the dominant strategy, since bank-industry networks are fully privileged.

**Proof:**  $(p = 1, q = 1)$  gives  $\det J = 1 > 0$  and  $\text{tr } J = -2 < 0$  and  $(p = 0, q = 0)$   $\det J = 1 > 0$  and  $\text{tr } J = 2 > 0$ . Hence,  $(p = 1, q = 1)$  is an evolutionary stable strategy, while  $(p = 0, q = 0)$  is an unstable equilibrium.  $\square$

Historical analysis (Marmefelt 1997, 1998b) indicates that the banking system and network commitment were sufficient institutional endowments for a spontaneous evolution in Sweden, while collective action was necessary in France.

Both Sweden and France had developed banking systems by 1870, but Swedish commercial banks were in a process of increasing their industrial involvement, while French commercial banking turned into a process of industrial disengagement. Swedish banks based their industrial involvement on a banker-entrepreneur interaction characterized by mutual trust and network commitment, while the industrial disengagement of French banks was a consequence of a banker-entrepreneur interaction based on distrust and reluctance to commitment.

The lack of mutual trust between bankers and entrepreneurs in France, reflected in a shift to arm's length finance, suggests that network commitment was an insufficient institutional endowment for a spontaneous evolution of bank-industry networks in France. The stability of Swedish bank-industry networks, their cooperative nature, and the preference of entrepreneurs for informed bankers indicate that network commitment was a sufficient institutional endowment for a spontaneous evolution of bank-industry networks in Sweden. In France, the government used collective action to design bank-industry networks as privileged groups. In Sweden, collective action was aimed at putting upper bounds on the bank convention, but tended to do so on the bond convention as well, since direct industrial shareholding by banks was prohibited in 1934, while the bank-industry networks were preserved through affiliated investment companies in the regulated financial system of 1950–1985.

### 3. The Lithuanian Holding as Bank-Industry Network

Although the Lithuanian holding company differs from the Swedish ownership sphere, one may consider it as a bank-industry network held together through ownership links, i.e. a kind of ownership sphere based on the holding rather than on an affiliated investment company of a bank. Yet, we may not conclude that Lithuanian holdings are functionally similar to Swedish ownership spheres.

Schumpeter (1949) stresses that banks have established themselves as a social organ of entrepreneurial activity to an extent that differs between countries. In addition, bank-industry networks change over time. Schumpeter (1911) considers credit creation as a prerequisite for innovation, while Schumpeter (1949) argues that external finance is most often necessary as original source of finance even if self-financing may become possible later on. Self-financing implies that the original credit finances a sequence of innovations through retained transient monopoly profits (Marmefelt 1998c). Industrial enterprises may



also internalize banking.<sup>2</sup> The bank-industry network is, nevertheless, based on durable links between a banker and a set of entrepreneurs and requires sufficient institutional endowments of a developed banking system and network commitment.

Lithuania, as an emerging market economy, should be expected to have limited institutional endowments as far as the banking system goes, while the issue of network commitment has to be studied through historical analysis dealing with the entrepreneurial function and its role within the network. In addition, the privatization process is guided by government collective action. Marmefelt (1997, 1998a, 1998b) regards learning-by-financing as the function of the bank-industry networks, but this may not be the case for the Lithuanian holding, where one has to consider collective action of the old *nomenklatura* during the privatization process and rent-seeking as an alternative function.

Using Schumpeter's (1927) idea of a multiple-peaked social pyramid, one may say that the old socialist, Soviet mentality may coexist with the emerging capitalist, entrepreneurial social ranking order. In Lithuania, the old communist *nomenklatura* maintained a considerable economic power, as is reflected in the literature. Former communists were leading investors during the privatization process (Nørgaard 1996). The holding companies with their diversified groups have become a political block having close links with the state bureaucracy (Maldeikis 1996). Former communist businessmen and state officials who had a vested interest in the privatization established close links (Lieven 1993). Officials tried to secure their own commercial interests (Gazarian 1995). Furthermore, political polarization influenced the emerging civil society (Vardys and Sedaitis 1997). Within this polarized system, Sąjūdis represented the small private entrepreneurs (Nørgaard 1996). The coexistence of capitalist leaders and communist leaders in the emerging market economy of Lithuania was characterized by high conflict intensity, thus reflecting a low degree of trust and network commitment. Collective action was necessary to achieve cooperation. If the banking system and network commitment were insufficient institutional endowments, then other factors were at work, thus turning the focus to *nomenklatura* collective action during the privatization process.

In Lithuania, 5666 enterprises were privatized through vouchers during the first stage of privatization, allowing the private sector to produce 65% of GDP in 1996 (OECD 1998). The holdings were legalized in 1991 as investment funds, where people invested their vouchers for shares of those funds, which were most active in 1992–1993 (Mygind 1999). According to Hirschhausen and Hui (1998), eight of them accumulated 52% of the invested vouchers, each controlling a commercial bank, one or more insurance companies, distribution networks, and trade organizations. This makes the holding into a bank-industry network, but is learning-by-financing its function?

According to Morkūnaitė (1998), most holdings lacked a coherent investment strategy and their share of privatized capital dropped from 30% to 21% following the increase of the share allowed to insiders from 30% to 50% in 1993. Semeta (1995) claims that the primary ownership structure shifted from 10–20% employees/managers in 1991 to 30% in 1992, and 50–60% in 1993, while the holdings declined from 30–50% in 1992 to 30% in 1993. Eight of the holdings dominated industrial sectors, while MBOs increased the role of insiders (Hirschhausen and Hui 1998). Most investment funds were set up as leverage for a group of insiders (Mygind 1999). One may argue that the increasing role of insiders

prevented the holdings from becoming bank-industry networks whose function is learning-by-financing. This is consistent with Mygind's (1999) finding that enterprises with domestic financial owners have a very low debt/equity ratio, especially compared to those with foreign owners. The World Bank (1998) considers the favorization of insiders as a major reason behind the poor corporate governance in Lithuania and argues that the role of banks should be facilitated through board representation clauses in large lending contracts. This leads us to an assessment of the bank convention in Lithuania.

Marmefelt (1998b) uses the ratio of money plus quasi-money to GDP as a rough indicator of the strength of the bank convention, since the money supply reflects deposits and thereby bank lending to the private sector. Lithuania and Sweden are compared for the 1994–1997 period, thus allowing the holdings to be established before. One might argue that Lithuania of the 1990s should be compared to Sweden of the 1890s, but Sweden did, in fact, have a well-developed banking system before her industrial breakthrough in 1890–1920. According to Sandberg (1978), the ratio of assets of all financial institutions to GNP was 0.89 for Sweden and 0.50 for France in 1880, increasing to 1.36 for Sweden and 1.04 for France in 1913. Consequently, the banking system had to be well developed in Lithuania, in order for bank-industry networks to evolve spontaneously in the early 1990s. Hence, a straight comparison is warranted. Table 1 shows that Lithuania had a much lower ratio of money plus quasi-money to GDP than Sweden. This suggests insufficient institutional endowments of developed banking and network commitment in Lithuania, because it reflects financial fragility and low trust between bankers and entrepreneurs.

The bank convention implies that bank-industry networks improve innovativeness through learning-by-financing that makes efficient the Hayekian discovery procedure. This should be reflected in the development of intellectual property rights. The protection of intellectual property rights by the state may differ between countries, but that will create different incentives to innovate, since patents influence entrepreneurial rents. Table 2 shows that the number of grants of patents per capita was much smaller in Lithuania than in Sweden, thus suggesting small innovative investments in Lithuania.

*Table 1.* Ratio of money plus quasi-money to GDP.

	1994	1995	1996	1997
Lithuania	0.21	0.21	0.17	0.17
Sweden	0.47	0.44	0.46	0.46

*Source:* IMF International Financial Statistics, 1998.

*Table 2.* Grants of patents per 1000 inhabitants.

	1994	1995
Lithuania	0.11	0.13
Sweden	2.61	2.36

*Source:* UN Statistical Yearbook, 1995.

*Table 3.* Productivity of Lithuanian industry (1992 = 100).

	1993	1994	1995
Metal & scrap metal	90.4	86.3	92.2
Machinery & equipment	80.8	53.3	73.4
Food & beverages	79.9	67.6	62.6
Light	51.5	31.7	39.7
Chemical	56.6	79.9	113.9
Wood, paper & furniture	67.3	58.8	46.3
Construction materials	66.6	55.5	77.5

*Source:* Rainys (1998).

Rainys (1998) has conducted branch studies of industrial restructuring in Lithuania using data from the Lithuanian Department of Statistics and observes that industrial production fell much more than employment, a post-socialist phenomenon following the breaking away from socialist economic coordination. We may use that data to compare the productivity decline between sectors, in order to assess whether the holdings have decreased the decline.

According to Morkūnaitė (1998), the holdings invested in light industry, construction materials, food processing, and furniture industries. If the holdings improved innovativeness, then they should have decreased the productivity slowdown following the breakdown of the socialist economy in those industries. Table 3 shows that on average productivity of those industries declined to 56.6% of the 1992 level in 1995 compared to 72.2% for the sample average. Only construction materials performed better than the sample average.

We may, therefore, argue that there is no conclusive evidence that holdings improved productivity through a higher innovativeness. This suggests that learning-by-financing of the holdings was low, thus preventing them from being restructuring agents, a role attributed to them by Radošević (1997). Hayek's (1978) discovery procedure remained inefficient. Hence, learning-by-financing cannot be considered the function of the Lithuanian holding. The role of banks was very limited when the holdings emerged as well as innovative activity, as illustrated by the grants of patents per capita and the relative productivity development in industries where holding invested.

The reason behind the lack of learning-by-financing can be found in the limited role played by the holdings as financiers. According to Rainys (1998), the holdings lacked capital even if they were the largest owners, while Lithuanian banks had insufficient equity to finance long-term projects. Hence, both network commitment as well as the banking system were insufficient institutional endowments, so entrepreneurs had to look for bankers abroad. Western capital investment and bank loans to sound investment projects have become available, thus making foreign capital the main sources of finance for industrial restructuring (Rainys 1998, Maldeikis 1998). The second stage of privatization is hard currency-based aimed at attracting foreign direct investment (OECD 1998), something which may upgrade technology (Radošević 1997). Foreign ownership promotes innovation more than domestic ownership, because learning-by-financing is better among foreign owners. Enterprises with foreign owners are more inclined to proactive restructuring, i.e. developing new markets,

new products, and new production processes, because they both invest more and have better access to loans (Mygind 1999, OECD 2000).

According to Rainys (1998), light industry networks and small wood processing firms have entered Western networks. OECD (1998) observes that the textile sector, characterized by a number of joint ventures and relatively modern production facilities, increased its share of export from 9.7% in 1993 to 16.2% in 1997, while the wood processing sector shifted from chipboard to solid furniture and from Soviet to EU markets. Thus, learning-by-financing, innovation, and economic evolution have been possible when the banker was Western. However, the ability of industries to attract foreign direct investment depends on their skills and extant technology. Maldeikis (1998) argues that foreign direct investment was directed to food, light, and wood and paper industries due to their qualified labor force and relatively modern technology. Learning-by-financing may, thus, occur among Western bankers in Lithuania.

Summing-up, the bank convention was weak in Lithuania when the holdings emerged, since the banking system and network commitment were insufficient institutional endowments, and learning-by-financing was clearly not the function of the Lithuanian holding, whose discovery procedure remained inefficient.

#### **4. Lack of Finance and the State as Creditor: The Banking System and Network Commitment as Institutional Endowments**

The undeveloped banking system and the low network commitment can be seen as a Soviet legacy, but the problem is more complex. Following Nørgaard and Johannsen (1999), the interwar period functions as a frame of reference for the Baltic states when forming strategies to overcome the fundamental barriers to development created during the Soviet period. Any subjectivist explanation of post-socialist economic behavior in Lithuania must take the interwar period of independence into account. Given that the presocialist legacy provided institutional endowments in the frame of reference when forming strategies to break away from socialism, a comparison between the early post-socialist independence and the interwar independence explains why the banking system and network commitment were insufficient when the holdings emerged, in terms of the Lithuanian frame of reference.

A developed banking system and network commitment did not exist in the Lithuanian frame of reference. In fact, the Lithuanian government had to resort to collective action during Lithuania's interwar independence, because both the banking system and network commitment were insufficient institutional endowments in interwar Lithuania. The literature gives a picture of an agricultural economy, where the government played the role of coordinator and financier.

Vardys and Sedaitis (1997) characterize the Lithuanian interwar economic system as a mixed one with a cooperative movement and a large state ownership. Hiden and Salmon (1994) state that Lithuania had an agricultural economy and got its first industrial center with the conquest of Klaipeda (Memel) in 1923. According to Samonis (1996), economic progress was based on agriculture, while economic policy maintained macroeconomic stability and a strong currency. In addition, the state had an entrepreneurial function and a creditor function. The state restructured agriculture through the land reform in 1922, which

established the medium-sized farm, and was a major investor (Vardys and Sedaitis 1997). Hence, the state distributed the property rights of land and became a banker-capitalist.

The importance of the state was an outcome of the weak banking system. The Baltic states had been integrated within the Russian banking system, but when they became independent after World War I, German banks entered the Baltic markets (Lieven 1993). Lithuania even used the German ostmark as currency until 1922, thus creating a strong German influence (Hiden and Salmon 1994). Yet, Vardys and Sedaitis (1997) argue that foreign investors were reluctant and that the shortage of financial resources was an obstacle to industrial development. This gave a frame of reference, where the state was creditor due to undeveloped banking in an agricultural economy, while network commitment hardly existed. In other words, there was no pre-socialist tradition of developed banking and network commitment to be resumed in post-socialist Lithuania.

In post-socialist Lithuania, Jucevicius and Stankeviciute (1996) find that entrepreneurs have had problems with insufficient financing due to inflexible banks. This should be seen in the light of low banking skills. As EBRD (1997) argues, banks in transition economies do not have the required monitoring skills to be involved in industry. In Lithuania, this is the result of a combination of Soviet banking and the frame of reference provided by Lithuania's interwar independence.

In Lithuania, a two-tier banking system with a central bank, three large state banks and twenty commercial banks was established in the early 1990s (World Bank 1993, IMF 1992, 1993). Consequently, one can hardly expect industrial banking to be developed. Interenterprise credit has been used instead of bank credit (IMF 1993). Domestic credit remained insignificant, so foreign credit was necessary (Boroch 1996). In order to supply medium- and long-term credit to private enterprises, the Lithuanian government and the European Bank for Reconstruction and Development, EBRD, created the Lithuanian Development Bank in 1994 (Plötz and Ritter 1997). This represents joint collective action of the Lithuanian government and a foreign creditor and reflects insufficient institutional endowments, which partly can be attributed to Soviet banking practices.

The socialist heritage of soft banking has created a stock of bad loans as well as bad banking principles for lending (EBRD 1997). Hence, non-bank financial institutions had to perform the creditor function, something which may explain the emergence of the holdings. However, they performed an ownership function, not a creditor function. Thus, learning-by-financing decreasing the information costs of the banker and the financing costs of the entrepreneur cannot be assumed to characterize the holdings. Maldeikis (1996) observes that the Lithuanian holding companies have not eliminated the shortage of credit, although they have developed diversified groups, while Mygind (1999) finds that enterprises with domestic financial owners have a very low debt/equity ratio. This leads us to the privatization process and the reforms making a "spontaneous" evolution of bank-industry networks around holdings feasible, an evolution where collective action of the *nomenklatura* was important.

The Lithuanian voucher privatization followed a distributional model aiming at a fast transition from plan to market, while promoting social equity and justice, but led instead to investment funds without capital through accumulation of vouchers (Maldeikis 1996). Investment funds, registered as either investment funds or holding companies, established an insider-controlled corporate governance (EBRD 1997). The favorization of insiders led to

poor corporate governance and bad economic performance (World Bank 1998, Mygind 1999, OECD 2000). The reason behind the negative impact insiders had on corporate governance can be found in the Soviet heritage of Lithuanian industry.

The late industrialization in Lithuania was carried out within the Soviet centrally planned economy, where Lithuania became a large-scale supplier of light machinery and electronics, processed food, and light industrial products (IMF 1992, 1993). In fact, the innovation of the holdings was to create new, domestic networks when the Soviet economy disintegrated. ESWB, the holding that took control over the electronics industry, which had been closely integrated with the Soviet economy, organized a domestic network of suppliers (Hirschhausen and Hui 1995). This supply network represents an innovation in the sense of Schumpeter (1911). Hence, the holdings were able to be innovative in response to the disintegration of the Soviet economy. According to Vardyitis and Sedaitis (1997), the large Lithuanian factories were a part of the Soviet military-industrial complex. Referring to Schumpeter (1927), Lithuanian industry had a strong socialist tradition and thereby a mentality, which transforms itself from socialism to capitalism with much more inertia than the social ranking order. This can be considered as an institutional endowment of a resilient *nomenklatura* that provides a fundamental obstacle to development that Lithuania had to overcome with a frame of reference with the state as creditor without developed banking and network commitment. Consequently, the frame of reference did not offer a viable alternative to the resilient *nomenklatura*, something which affected the privatization process.

The distributional model was far from pure. According to Maldeikis (1996), the privatization was stopped in late 1992 and early 1993 due to agreements on prices, insider information, sales of officials, and pre-auction distribution. Samonis (1996) argues that the process became blurred to the benefit of the old *nomenklatura*, when the privatization was resumed, since the management of a state-owned firm was able to use bank contacts to obtain a loan with unsold output as collateral in order to finance the purchase of vouchers. Former communists were both in control of the banking system and leading investors (Nørgaard 1996). Hence, the old political class—the communist *nomenklatura*—managed to exploit the privatization process to maintain its position. The social ranking order became capitalist, while the mentality remained socialist.

The voucher privatization was the way of the state to distribute the property rights of capital. Samonis (1996) describes the transformation till 1992 as a full speed to competitive markets through voucher privatization, price and trade liberalization, a tight fiscal and monetary policy with the Ministry of the Economy as think tank. This seems to be the same role as the state had during the interwar independence, but did the state assume the creditor function this time?

On the one hand, the state was able to perform the creditor function with help from foreign creditors, as illustrated by the creation of the Lithuanian Development Bank, mentioned earlier. On the other hand, the state seemed unable to support the market economy. According to Gazaryan (1995), the state centralized power without norms and control, reflected in state officials who tried to secure their own commercial structures. Hence, the role of the state as banker-capitalist became more ambiguous during the post-socialist independence, something which opened up for the emergence of the holding companies. This reflects that the frame of reference did not provide a viable alternative to the resilient *nomenklatura*.

The ambiguous role of the state together with the voucher privatization led to accumulation of vouchers in the investment funds, from which the holdings have emerged. Privatized firms had to deal with unresolved debt to the state and social security fund, thus making potentially viable firms insolvent (Maldeikis 1996). Most people sold their vouchers when they were granted the possibility of becoming owners of doubtful shares (Gazaryan 1995). This made accumulation of vouchers possible.

Summing-up, the banking system and network commitment were insufficient institutional endowments for a spontaneous evolution of bank-industry networks in Lithuania during her interwar independence as well as her post-socialist independence, so the pre-socialist, interwar frame of reference did not provide a viable alternative to the Soviet heritage, which created the institutional endowment of a resilient *nomenklatura*.

### **5. Authoritarian Nationalism, Presidential System, and Soft State: Network Commitment versus Resilient *Nomenklatura* as Institutional Endowment**

The resilient *nomenklatura* can be explained by the Lithuanian combination of a soft state, a strong presidency, and a well-organized former communist party. Post-socialist Lithuania developed a presidential system rather than a parliamentary one, but the state remained soft with widespread corruption (Nørgaard 1996). The experience of a lawful state was limited and the former communists created obstacles to state building through their disregard for the constitution (Vardys and Sedaitis 1997). The state came under their control as well as industry. Former communists were leading investors and crowded out the civil servants from the state (Nørgaard 1996). Having control over the state was important to the old communist *nomenklatura*, since the Lithuanian political culture was authoritarian.

According to Vareikis (1998), nationalism prevented the formation of a civil society during the interwar independence of Lithuania and continues to do so. The constitution gave priority to the nation and the family over the individual, while the Catholic church favored an authoritarian kind of nationalism (Lieven 1993). Network commitment was unable to develop in such an authoritarian society. Referring to Fukuyama (1995), authoritarian nationalism destroyed the capacity for spontaneous sociability already in interwar Lithuania, thus ruling out strategies based on spontaneous sociability in post-socialist Lithuania, reflecting a frame of reference without network commitment.

The authoritarian political tradition can be traced back to the Smetona dictatorship during the interwar independence and its mythology of the medieval Grand Duchy. Political instability led to the establishment of the Smetona regime in 1926 (Nørgaard 1996, Vardys and Sedaitis 1997). Smetona balanced military and social forces (Vardys and Sedaitis 1997) and created a mythology of the medieval Grand Duchy (Lieven 1993). During the 13th century, Mindaugas had unified the Lithuanian tribes into a pagan state, where Russians and Byelorussians together outnumbered the Lithuanians (Vardys and Sedaitis 1997). The creation of the Grand Duchy from the Baltic Sea to the Black Sea was due to pagan rulers Gediminas, Algirdas, Kestutis, and Vytautas (Vareikis 1998). Hence, the Lithuanian Grand Duchy was seen as a strong nation, a Great Lithuania with a strong leader.

Smetona used this mythology to develop a political culture characterized by authoritarian nationalism that remained a viable legacy. According to Vareikis (1998), the Grand Duchy

and the Smetona regime with its good economic times in the 1930s were seen as the golden age during the Soviet regime. This reveals a preference for authoritarian nationalism, a society with a strong leader rather than spontaneous sociability. Authoritarian nationalism is essentially the core of Lithuania's pre-socialist, interwar frame of reference. Post-socialist Lithuania can, thus, be considered as a low-trust society, where authoritarian nationalism prevented spontaneous sociability.

Marmefelt (1997, 1998b) characterizes 19th century Sweden as a high-trust society with abundant social capital, since economic agents had a great ability to work together on the basis of shared values, leading to mutual trust between bankers and entrepreneurs. Post-socialist Lithuania must, however, be considered as a low-trust society, where cooperation between bankers and entrepreneurs required collective action.

The importance of collective action, however, created a potential power base for the old communist *nomenklatura*. After the restoration of independence, Sąjūdis under Landsbergis tended to ritualize politics rather than working on daily issues, such as the decline of living standards, thus opening the door for the former communists who had kept their core intact (Lieven 1993).

A well-organized former communist party together with authoritarian nationalism, a presidential system, and a soft state made a strong position for the *nomenklatura* possible, thus contributing to a weak network commitment and a resilient *nomenklatura*.

## **6. The Evolution of the Holding Company and the Hayekian Discovery Procedure: Post-Socialist Capitalization as an Evolutionary Crossroads Game**

Marmefelt (1997, 1998a, 1998b) analyzes Schumpeterian banker-entrepreneur interaction as an evolutionary Stag Hunt game, because the banker and the entrepreneur would be better off if they cooperate within a network, but only if both of them do so. Using Hayek's (1978) view of competition as a discovery procedure, the bank-industry network leaves fewer opportunities unused due to a more efficient process of exploration.

Here, post-socialist capitalization will be analyzed as an evolutionary game, where strategies are replicators. What are the implications for the Lithuanian holding of an undeveloped banking, lack of network commitment, and a resilient *nomenklatura*? Referring to Hayek (1978), the answer to that question explains the incomplete transition from economy in the strict sense, where resource allocation is deliberate, to catallaxy, the market order.

According to Hirschhausen (1996), post-socialist capitalization differs from privatization, because the former means the creation of new capitalist enterprises, while the latter is a mere transfer of ownership of the socialist combines. The evolution of holding companies can, nevertheless, be regarded as a kind of capitalization. The reason is that they have to sell the shares of privatized firms on the National Stock Exchange, founded in 1993 (Maldeikis 1996).

The capitalization game, thus, involves competition between two populations, each representing a type of investor fighting for the ownership of new enterprises, the entrepreneurial capitalists (EC) and the *nomenklatura* rent-seekers (NRS). The former are, as banker-capitalists in the sense of Schumpeter (1911), involved in the exploration of new technologies, while the latter try to squeeze out as much as possible of the old, socialist technologies.



EC-investors have a discovery procedure guided by catallaxy, while NRS-investors have one guided by economy in the strict sense. Within both the EC-population and the NRS-population, investors try to cooperate in holdings in order to take over enterprises, thus giving own-population effects when the two populations interact in a struggle about the ownership of new enterprises. Hence, the EC-population prefers one equilibrium and the NRS-population another one. As pointed out by Walliser (1998), this kind of strong coordination problem can be illustrated by the Crossroads game, although he uses the payoff matrix of the Chicken game, which has the same best outcome and worst outcome as Sugden's (1986) Crossroads game.

From an evolutionary perspective, Chicken and Crossroads have the same evolutionary equilibria. It holds for both games that a driver who goes at a crossroads when the other stops receives the best outcome, while a car crash when both go gives the worst one. However, the next best outcome in Chicken is the next worst one in Crossroads and vice versa. Sugden's (1986) Crossroads game says that a driver who stops to let the other go receives a better outcome than if they both stop, because it allows the driver to go safely with a short delay and thereby receive a better outcome than if they both stop, thus leaving priorities unsettled. In Chicken, called Crossroads by Walliser (1998), a driver who stops to let the other go receives a worse outcome than if they both stop, because it allows the other to get ahead.

For post-socialist capitalization, I have chosen the Crossroads game, because the payoffs reflect that the best outcome for an investor is to take over when the other abstain and the worst outcome when both get involved in a fight to take over, while it is better to abstain and let the other investor take over than to leave the ownership issue unsettled.

As the investors interact as satisficing agents in a world with uncertainty and bounded rationality, I will analyze post-socialist capitalization as an evolutionary Crossroads game, where the behavior of investors is determined by either the take-over replicator or the abstain replicator. This game gives two conventions of capitalization:

- (i) The capitalist bank convention, where the function of bank-industry networks is learning-by-financing and the discovery procedure is guided by catallaxy, thus corresponding to the bank convention in Section 2. Industrial owners are all EC-investors.
- (ii) The *nomenklatura* bank convention, where the function of bank-industry networks is rent-seeking by the *nomenklatura* as privileged group and the discovery procedure is guided by economy in the strict sense. Industrial owners are all NRS-investors.

For each enterprise within a generation of enterprises, an EC-investor and an NRS-investor are paired randomly in a game about the ownership of the new enterprises of that generation. In addition, both EC-investors and NRS-investors are paired randomly within their own population with some positive probability, thus giving own-population effects, which imply that they cooperate when one of them interacts with someone from the other population. Investors play new games about the ownership of the new enterprises of the next generation.

Investors may choose either strategy 1 (take over the shares of the enterprise) or strategy 2 (abstain from taking over the shares of the enterprise). According to disposition, EC-investors and NRS-investors choose a pure strategy, thus giving a strategy mix within each population, and interact both within the own population to form holdings and with the other

population in order to gain the ownership of the enterprises. Let us assume Malthusian dynamics, also known as replicator dynamics, where the growth rate of a strategy is equal to its relative fitness. Let the replicator dynamics depend on the sum of population interaction and own-population effects, along the lines of Friedman (1998).

The historical analysis of Lithuania in the preceding sections, give the following propositions as working hypotheses:

**Proposition 1.** *Bank-industry networks may emerge around holding companies as non-bank financial institutions when the banking system is undeveloped.*

**Proposition 2.** *Collective action is crucial in the formation of bank-industry networks when the authoritarian political culture gives a weak network commitment.*

**Proposition 3.** *Collective action will take place within the nomenklatura when the state is soft and the nomenklatura resilient.*

**Proposition 4.** *The combination of insufficient network commitment and a resilient nomenklatura favors rent-seeking above learning-by-financing.*

Bank-industry networks may evolve spontaneously only when the banking system and network commitment are sufficient institutional endowments, otherwise collective action, which designs privileged groups, is necessary (Marmefelt 1997, 1998a, 1998b). This implies that the Lithuanian holding evolved through collective action. In this context, the NRS-investors constitute an extant privileged group of investors who coordinate themselves through collective action, while the EC-investors coordinate themselves spontaneously with low network-specific payoffs, reflecting the weak network commitment in society.

Coordination within populations can be seen as own-population effects, where spontaneous order coordination follows the Stag Hunt game and collective action the Fully Privileged Stag Hunt game, along the lines of Marmefelt (1997, 1998a, 1998b). The idea is that two EC-investors, EC1 and EC2, may become better off if they cooperate, while two NRS-investors, NRS1 and NRS2, become better off, because they coordinate through collective action, as illustrated by the payoff matrices of Figures 3 (where  $a > 1$ ) and 4.

The EC-population interacts with probability  $\rho$  and the NRS-population interacts with probability  $\sigma$ , where  $0 < \rho < 1$  and  $0 < \sigma < 1$ . The growth rate of take-over investors

		EC2	
		1 (Take-over)	2 (Abstain)
EC1	1 (Take-over)	$a, a$	$0, 1$
	2 (Abstain)	$1, 0$	$1, 1$

Figure 3. Coordination within the population of entrepreneurial capitalists as a Stag Hunt game.

		NRS2	
		1 (Take-over)	2 (Abstain)
NRS1	1 (Take-over)	2,2	0,1
	2 (Abstain)	1,0	-1,-1

Figure 4. Coordination within the population of *nomenklatura* rent-seekers as a Fully Privileged Stag Hunt game.

		NRS-investor	
		1 (Take-over)	2 (Abstain)
EC-investor	1 (Take-over)	0,0	3,2
	2 (Abstain)	2,3	1,1

Figure 5. Post-socialist capitalization as a Crossroads game.

from own-population effects, reflecting the formation of holding companies, increases with relative fitness of the take-over strategy, according to Malthusian dynamics. Hence, the growth rate is equal to the relative fitness of the take-over strategy in each population with probability  $\rho$  and  $\sigma$ , respectively.

Let  $r$  denote the share of take-over investors in the EC-population and  $s$  the share of take-over investors in the NRS-population. The corresponding own-population effects become  $\rho(ar - 1)(1 - r)$  and  $\sigma(1 - s)$ . A weak network commitment implies that  $1 < a \ll 2$ , which means that the probability that EC-investors cooperate is very small, because the basin of attraction of the take-over strategy becomes very small compared to the basin of attraction of the abstain strategy. Hence, the probability that network commitment is insufficient for a spontaneous evolution of EC-holdings is very high. The interaction between EC-investors and NRS-investors follows the Crossroads game, whose payoff matrix is shown in Figure 5.

Relative fitness of the take-over strategy from interaction between populations becomes  $(2 - 4s)(1 - r)$  for the EC-investors and  $(2 - 4r)(1 - s)$  for the NRS-investors. As the replicator dynamics depend on the sum of population interaction and own-population effects, the growth of the share of take-over investors in the EC-population becomes:

$$\dot{r} = r(2 - 4s + \rho(ar - 1))(1 - r), \quad (6.1)$$

while the growth of the share of take-over investors in the NRS-population becomes:

$$\dot{s} = s(2 - 4r + \sigma)(1 - s). \quad (6.2)$$

Equation (6.1) shows that the share of take-over investors in the EC-population is stable when  $r = 0;1$  or  $s = (2 + \rho(ar - 1))/4$ . Similarly, Eq. (6.2) shows that the share of take-over investors is stable in the NRS-population when  $s = 0;1$  or  $r = (2 + \sigma)/4$ .

Following Friedman (1991, 1998), evolutionary equilibria, such as evolutionary stable strategies, may be identified through a local stability analysis of the Jacobian of the system consisting of Eqs. (6.1) and (6.2). The determinant of the Jacobian becomes:

$$\det J = [(2 - 4s + \rho(ar - 1))(1 - 2r) + \rho ar(1 - r)](2 - 4r + \sigma)(1 - 2s) - 16rs(1 - r)(l - s), \quad (6.3)$$

while the trace becomes:

$$\text{tr } J = (2 - 4s + \rho(ar - 1))(1 - 2r) + \rho ar(1 - r) + (2 - 4r + \sigma)(1 - 2s). \quad (6.4)$$

Local stability analysis shows that there are two evolutionary equilibria, evolutionary stable strategies, of the Crossroads game with own-population effects: the capitalist bank convention with EC-holdings, ( $r = 1, s = 0$ ), and the *nomenklatura* bank convention with NRS-holdings, ( $r = 0, s = 1$ ), whose respective basins of attraction are separated by a saddle point, ( $r = (2 + \sigma)/4, s = (2 + \rho(a(2 + \sigma)/4 - 1))/4$ ).

**Proof:** ( $r = 1, s = 0$ ) gives  $\det J = (2 + \rho(a - 1))(2 - \sigma) > 0$  and  $\text{tr } J = -4 - \rho(a - 1) + \sigma < 0$  and ( $r = 0, s = 1$ )  $\det J = (2 + \rho)(2 + \sigma) > 0$  and  $\text{tr } J = -4 - \rho - \sigma < 0$ . Hence, they are both evolutionary stable strategies. These two evolutionary equilibria have basins of attraction which are separated by a saddle point:

$$(r = (2 + \sigma)/4, s = (2 + \rho(a(2 + \sigma)/4 - 1))/4).$$

At this point,  $\det J = -(2 + \sigma)(2 + \rho(a(2 + \sigma)/4 - 1))(1 - (2 + \sigma)/4)(1 - (2 + \rho(a(2 + \sigma)/4 - 1))/4) < 0$ .  $\square$

The basin of attraction of the capitalist bank convention is smaller than the one of the *nomenklatura* bank convention whenever  $r > s$  at the saddle point, because the saddle point is closer to the capitalist bank convention in this case, which is fulfilled when:

$$\sigma(4 - \rho a) > \rho(2a - 4). \quad (6.5)$$

The inequality will be violated only when  $a \geq 4(\rho + \sigma)/\rho(2 + \sigma)$ . Recall that the weak network commitment in Lithuania implies that  $1 < a \ll 2$ . As the right-hand side becomes negative, the inequality in Eq. (6.5) holds. Consequently, the basin of attraction of the *nomenklatura* bank convention was larger than the one of the capitalist bank convention in Lithuania. This implies that the banker of the Lithuanian holding was more likely to be a *nomenklatura* rent-seeker than an entrepreneurial capitalist, which is consistent with the evolution of insider-controlled corporate governance observed in Lithuania as well as the indicators of a low learning-by-financing among Lithuanian holdings. What are then the consequences for the holding as bank-industry network?

Marmefelt (1998b) considers a network between a banker and three entrepreneurs with learning-by-financing both directly through the links between the banker and each entrepreneur and indirectly through the links between the entrepreneurs in order to analyze

network complexity. Here, the network consists of a banker and two entrepreneurs,  $i$  and  $j$ , since some connectionist elements of Zambrano's (1998) complex adaptive systems approach will be incorporated into the analysis.

Following Marmefelt (1998b), there exists a trade-off between the duration of the network link between the banker and entrepreneur  $i$  and the one between the banker and entrepreneur  $j$ :

$$d_i d_j = c, \quad (6.6)$$

where  $d_i$  and  $d_j$  are the durations of the links between the banker and entrepreneur  $i$  and  $j$ , respectively, and  $c$  network commitment between the entrepreneurs. Furthermore, network complexity implies that learning-by-financing about entrepreneur  $i$  is a joint product between the duration of the link between the banker and entrepreneur  $i$  and the sum of the durations of the links between the banker and both entrepreneurs of the network:

$$\theta_i = l_{pri} d_i + l_{pub} (d_i + d_j). \quad (6.7)$$

Equations (6.6) and (6.7) give the network commitment dependent learning-by-financing function:

$$\theta_i = l_{pri} d_i + l_{pub} (d_i + c/d_j). \quad (6.8)$$

Equation (6.8) says that the higher the network commitment between entrepreneurs,  $c$ , the higher the contribution network complexity,  $l_{pub}$ , may give to learning-by-financing, like Marmefelt (1998b) concludes. Recall that bank-industry networks are based on a sequence of complementarities as well as mutual trust and network commitment. Externalities are, thus, distributed between reciprocal agents. This holds for entrepreneurial capitalists, but not for *nomenklatura* rent-seekers who use their power position within the *nomenklatura*. This will be reflected in different distributions of externalities, where reciprocity will characterize EC-networks, but not NRS-networks. Referring to Hayek's (1978) discovery procedure, reciprocal exchange is crucial to catallaxy, while the deliberate resource allocation of economy in the strict sense is based on authority supported by coercion. Zambrano's (1998) connectionist notion of the effect of the activity of an agent on the activity of another agent may shed some light on this issue.

Let  $e_{ij}$  denote the subjective positive externality, such as perceived benefits of knowledge transfer and access to new markets, of the activity of entrepreneur  $j$  on the activity of entrepreneur  $i$ . Since EC-networks have reciprocal entrepreneurs,  $e_{ij} = e_{ji}$ . Following Zambrano (1998), entrepreneurs are dynamically reciprocal if:

$$\dot{e}_{ij} = k(e_{ji} - e_{ij}). \quad (6.9)$$

There is a steady state if  $e_{ji} = e_{ij}$ , i.e. if agents remain reciprocal. In order to consider entrepreneurs of NRS-networks, who are ranked according to their power position, one has to add  $\varepsilon > 0$ , so  $e_{ij} - e_{ji} + \varepsilon$ , where entrepreneur  $i$  has a stronger *nomenklatura* position

through a better contact with the banker than entrepreneur  $j$ . Hence, entrepreneurs are rent-seeking if:

$$\dot{e}_{ij} = k(e_{ji} + \varepsilon - e_{ij}). \quad (6.10)$$

Here, there is a steady state if  $e_{ij} = e_{ji} + \varepsilon$  and thereby  $e_{ji} = e_{ij} - \varepsilon$ , i.e. if one agent seeks rent from the other based on some power position. For the strong entrepreneur  $i$ ,  $e_{ij} = e_{ji} + \varepsilon$ , thus giving  $e_{ji} = e_{ij} - \varepsilon$  for the weak entrepreneur  $j$ . This contrasts to the case of reciprocal entrepreneurs, where entrepreneur  $i$  receives  $e_{ij}$  and entrepreneur  $j$   $e_{ji} = e_{ij}$ .

Commitment between interdependent agents requires reciprocity. Network commitment between entrepreneurs is, thus, dependent on the trade-off between the subjective externalities received by entrepreneur  $i$  and those received by entrepreneur  $j$ :

$$c = e_{ij}(e_{ij} - \varepsilon), \quad (6.11)$$

where  $\varepsilon = 0$  for EC-networks and  $\varepsilon > 0$  for NRS-networks.

Equations (6.8) and (6.11) imply that  $\theta_i | (r = 1, s = 0) > \theta_i | (r = 0, s = 1)$ , where  $\theta_i | (r = 1, s = 0)$  and  $\theta_i | (r = 0, s = 1)$  denote learning-by-financing about entrepreneur  $i$  of the capitalist bank convention and the *nomenklatura* bank convention respectively. Hence, learning-by-financing is larger in EC-networks than in NRS-networks due to higher network commitment under reciprocity. This suggests that the Lithuanian holding evolved with a rent-seeking function rather than a learning-by-financing function, since it was more likely to have a *nomenklatura* banker. In this case, there is a problem of institutional compatibility. The Lithuanian social order generated a discovery procedure guided by economy in the strict sense rather than catallaxy, thus leaving many opportunities unused.

By contrast, consider the case of the second hard currency stage of privatization aiming at attracting foreign direct investment. In this case, the desire to acquire Western capital and technology may induce network commitment among EC-investors towards their Western partners, who in their turn only interact with EC-investors. This would increase the payoff of the take-over strategy,  $a$ . In addition, increasing interaction between Lithuanian and Western partners would increase  $\rho$  relative to  $\sigma$ . This may, therefore, contribute to a situation, where  $a > 4(\rho + \sigma)/\rho(2 + \sigma)$ , thus violating the inequality in Eq. (6.5) and making the basin of attraction of the capitalist bank convention larger than the one of the *nomenklatura* bank convention. In this case, Eqs. (6.8) and (6.11) imply that learning-by-financing increases. Here, institutional compatibility becomes higher and the Hayekian discovery procedure becomes more efficient, because foreign investors substitute catallaxy for economy in the strict sense. This requires that foreign direct investment changes Hayek's (1967, 1973) learned, culturally transmitted rules.

Summing up, the undeveloped banking, the lack of network commitment, and the resilient *nomenklatura* of the first voucher stage of privatization made the Lithuanian holding companies more likely to converge to the *nomenklatura* bank convention, which gave a lower learning-by-financing, because rent-seeking behavior decreased network commitment and thereby the effect of network complexity, thus giving the Lithuanian holding a rent-seeking function. This created a problem of institutional compatibility of the Hayekian discovery

procedure between bank-industry networks in the Baltic Sea Area during Lithuania's first voucher stage of privatization that might be overcome by foreign direct investment initiated in the second hard currency stage.

## 7. Conclusions

Economic integration in the Baltic Sea Area requires institutional compatibility of the Hayekian discovery procedure between its social orders. Consequently, the discovery procedure of the Lithuanian holding has to be compatible with the one of the Swedish ownership sphere. The Lithuanian holding, which evolved out of the post-socialist voucher privatization in Lithuania, might be considered as an innovative bank-industry network, whose function is learning-by-financing, like the Swedish ownership sphere. Yet, there are some important differences in the evolution of Lithuanian and Swedish bank-industry networks.

The banking system and network commitment were insufficient institutional endowments in post-socialist Lithuania during the privatization process, unlike Sweden during the industrial breakthrough. Collective action was necessary to establish a viable bank convention in Lithuania, where the state had assumed the role of banker during Lithuania's interwar independence, giving a frame of reference that did not provide a viable alternative to the resilient *nomenklatura*, reflected in a more ambiguous role of the state during Lithuania's post-socialist independence, when the holding companies emerged. The authoritarian nationalism, which had been established during her interwar independence, created a low level of trust and network commitment. A well-organized former communist party together with authoritarian nationalism, a presidential system, and a soft state as well as a Soviet industrial heritage provided for a resilient *nomenklatura*.

Analyzing post-socialist capitalization as an evolutionary Crossroads game, I develop a model that explains how the post-socialist Lithuanian combination of an undeveloped banking, a weak network commitment, and a resilient *nomenklatura* influenced the evolution of the function of the Lithuanian holding. The evolutionary game has two conventions: (i) the capitalist bank convention, where the owners are entrepreneurial along the lines of Swedish ownership spheres, and (ii) the *nomenklatura* bank convention, where owners are rent-seekers who try to squeeze out as much as possible of the existing socialist technologies.

The Lithuanian holding is seen as a coalition of either entrepreneurial capitalists or *nomenklatura* rent-seekers in a two-person random pairing game between an entrepreneurial capitalist and a *nomenklatura* rent-seeker competing for the ownership of the enterprise. The institutional dynamics, where the coalitions yield own-population effects, give the probabilities of convergence to either the capitalist bank convention or the *nomenklatura* bank convention, respectively. As rent-seeking behavior decreases network commitment and thereby the effect of network complexity, learning-by-financing becomes weaker in the *nomenklatura* bank convention.

This suggests that the undeveloped banking, the weak network commitment, and the resilient *nomenklatura* of Lithuania during her first voucher stage of post-socialist privatization made the *nomenklatura* bank convention stronger than the capitalist bank convention, thus giving the Lithuanian holding a rent-seeking function. Hence, the Lithuanian social order generated an inefficient discovery procedure. Unlike Swedish ownership spheres,

Lithuanian holdings used a discovery procedure characterized by economy in the strict sense rather than catallaxy, thus providing a problem of institutional compatibility between bank-industry networks in the Baltic Sea Area during Lithuania's first voucher stage of privatization. This problem might be resolved by foreign investors' substituting catallaxy for economy in the strict sense, something which requires that foreign direct investment changes the learned, culturally transmitted rules.

## Notes

1. This section is based on Marmefelt (1997, 1998a, 1998b), where the interested reader may find the detailed analyses, here related to Hayek's (1967, 1973, 1976, 1979) view on spontaneous social order.
2. During the 1980s, the bank-industry networks in Sweden were sustained by internalized banking to an increasing extent (Marmefelt 1998b).

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