

**Pathways from Postsocialism:
Ownership Sequence and Performance of Firms
in Hungary, 1991-1999**

Running head: Pathways from Postsocialism

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abstract

Corporate ownership structures were important means to navigate postsocialist uncertainties, and as relational structures, they were vulnerable to subsequent path dependencies. Organizational innovations might outlive their relevant environments, locking firms in to underperform. This article analyzes the ownership sequences and performance of the 200 largest Hungarian firms between 1991 and 1999. Hungary in the nineties is a strategic historical case to understand turning points, sequencing and performance. Optimal matching analysis is used to identify pathways, and dynamic scaling analysis to delimit ownership regimes in time. Hypotheses about how sequences mattered are tested by regression models of performance. The findings indicate that network forms buffered uncertainties up to 1995, contributing to high labor and capital efficiency. After this period domestic corporate coalitions locked firms in, leading to inferior performance compared to manager buy-outs, domestic subsidiaries, and foreign owned firms. Joint ventures on the other hand provided protection and then later the option for concentrating ownership, outperforming other pathways of ownership.

The Sequence of Ownership Transitions and Performance of Firms in Hungary, 1991-1999

After the collapse of state socialism in Eastern Europe, economic transformations were profound: basic institutions of market coordination were established, fully state owned economies were privatized, and the inflow of foreign capital was massive (Bandelj 2002; Kogut 1996). In Hungary, uncertainties induced by these rapid changes were initially mitigated by organizational innovations, most prominently reorganizing assets in interorganizational networks (Stark 1996). In the second half of the nineties foreign direct investment became the dominant form of corporate ownership, with more than half of the capitalization in the large firm sector controlled by foreign investors (Stark and Vedres 2006). As the Hungarian economy became closely connected with a global economy, scholarly attention turned away from preceding organizational innovations.

Were postsocialist ownership structures adopted, transformed, or rejected as elements of a globally connected market economy? How did history matter in postsocialism? It is possible, although not likely, that history did not matter at all. Once market coordination replaces central planning, the advantage of privately owned firms over publicly held ones leads to the eradication and extinction of state ownership. And once the economy is opened to foreign investment, the advantage of being incorporated into a multinational conglomerate leads to the crowding out of domestically owned firms. In this scenario interorganizational ownership forms from the early nineties are a fleeting phenomenon in the context of grand transitions.

It is more likely that early ownership arrangements constrained subsequent ownership structures. From a path dependency perspective one would expect to identify ownership structures that became locked in, unable to adapt to changing times. Ownership structures might outlive their relevant environments, so that ownership forms past their due date affect performance. However, observing firms with unchanging ownership structures is not necessarily evidence of path dependence. An uneventful sequence might represent robust innovation – an ownership structure that ensures high performance in all environments. Alternatively, such a sequence might indicate relational entanglement, an ownership structure that leads to inferior performance in a new environment, and truly locks firms into their past innovation.

This article goes beyond a simple path dependency account by providing a framework in which path dependent organizational innovations can be identified. First, this article does not start out from predefined ownership forms (such as state or private, domestic or foreign), but rather it builds from patterns of ownership identified from the data. Second, this article analyzes the ownership sequences of firms in the context of major turning points in the ownership structures of the whole population of firms. This context enables distinguishing robust innovations from locked in sequences. And third, expectations are formulated and tested about performance, to see if ownership forms that seem to be locked into a path dependent course underperform more adaptive ownership structures.

The analysis is based on the ownership sequences and performance of the 200 largest Hungarian firms from revenue rankings in 1999. These firms represent a sizeable portion of the Hungarian economy: their combined revenue is 41% of the combined revenue of all Hungarian enterprises, they employ 22% of the workforce and their combined operating profit is 57% of the sum of operating profits in the country (Figyelő 2000). Ownership records and data on performance were obtained from the official archives of the Hungarian registry courts. The dataset records complete ownership histories with a monthly time resolution.

I analyze the evolution of ownership and postsocialist path dependencies in three analytic steps. In the first part I analyze the sequences of ownership forms to identify pathways. Firms in the same pathway go along similar ownership forms with a similar timing. The second part analyzes the context of pathways, to chart temporality at the macro level: to delimit phases and turning points in the transformation of large firm ownership. I devised a dynamic scaling approach to accomplish this task. Three regimes in ownership transformation were identified: The first is defined by state ownership and its early alternatives, primarily management buyouts. The second period is about the dichotomy of concentrated versus coalitional ownership. This period is defined by the emergence of intercorporate ownership networks. The third period is defined by foreign ownership and its domestic alternatives. The third part presents and tests hypotheses about path dependencies derived from sequence analysis. Hypotheses are tested by ordinary least squares regression models of performance.

The main finding is that there are strong path dependencies: ownership sequences follow a small set of pathways. There was a major turning point in these pathways in 1996-97: a shift from relational (coalitional) ownership forms to concentrated and globalized ownership. However, coalitions of domestic firms as owners (resembling recombinant property forms) persisted after this turning point. In 1995 coalitional ownership forms contributed to higher performance, while by 1997 there was no positive association between coalitional forms and performance. This suggests that while recombinant property buffered firms from uncertainties of postsocialism, it locked firms in, and did not contribute to performance in a stabilized economic environment. Early ownership changes left strong marks even after market economy had consolidated.

The transformation of ownership in Hungary

The restructuring of ownership relations was a key element in transforming East European economies. Extrication from state socialism involved selling state-owned assets to private owners. At the same time hundreds of thousands of private enterprises were established. Over the nineties the share of state ownership in the economy decreased from above 90 percent to about 15 percent (Stark and Vedres 2006). Meanwhile, the population of the largest firms in Hungary was a target of a sizeable inflow of foreign direct investment, making foreign ownership the most frequent form of property (Gray 1996). Hungary received the most foreign direct investment per capita in the region between 1989 and 1998¹. In sum, corporate ownership in Hungary transformed radically over the nineties, a decade of change that matches transformations that would unfold over a century in established market economies (Aganin and Volpin 2003; Bloch and Kremp 1997).

The transformation of ownership took place amidst uncertainties, created by the project to build a market economy after state socialism. In Hungary institutional uncertainties stemmed from new laws coming into force about practically all aspects of economic life at the end of the eighties and the first years of the nineties. Between 1988 and 1993 new laws about corporations, banking, accounting, taxation, and bankruptcy were created². For managers of large state owned firms and new private enterprises it was far from clear how these laws would be enforced, and what the combination of their effects would bring. Faced with the challenge of coping with new institutions, East European economies have at the same time plunged into a profound transformational recession (Fischer, Sahay, and Vegh 1996; Gerber and Hout 1998).

As firms faced changing regulations and mounting uncertainties, they started creating ownership ties to other domestic firms. There were various pressures on firms to become owners of one another. With a shortage of potential owners, and with an administrative pressure to become privatized, firms became owners of each other. Firms also spun off units that became fully or partly owned subsidiaries (McDermott 2004). In his 1996 article on recombinant property, David Stark argued that the ownership of large firms in Hungary was organized in network groups, entities that Stark labeled recombinants (Stark 1996). This network group formation was rooted in routines of interorganizational reciprocity inherited from the socialist period (Carroll, Goodstein, and Gyenes 1988; Czakó and Sik 1987). Managers built on these routines to use new institutions – limited liability forms and shareholding ownership – to create network ties of ownership stakes (Voszka 1991; Neumann 1993).

While uncertainties were radical, they were not uniform across all firms. Trading firms can adapt to changing environments better than manufacturing firms. Heavily industrialized economies in Eastern Europe drifted towards a merchant capitalism (Burawoy and Krotov 1992), while investment in manufacturing industry halted (Szanyi 1998). The financial sector had to write off much of its capital invested in manufacturing sector, but it was in a strong bargaining position to secure bailouts from the state (Kiraly 1995).

By the second half of the nineties foreign investors become key agents in transforming ownership. Foreigners were missing from the early literature of postsocialism, but the watershed of foreign direct investment led to abandoning the focus on societies in isolation to appreciate global linkages (Böröcz 2001; Janos 2001). Foreign owners, on one hand, are powerful actors that possess economic capital, and technological and organizational know-how that no domestic entity can compete with. On the other hand foreigners have a liability because of their foreignness (Zaheer 1995). One indication of this is that foreign investment in East Europe followed existing cultural and political ties, mitigating foreignness to some extent (Bandelj 2002). Ownership ties themselves can be means of fitting in. A large portion of foreign capital invested in Hungary became embedded in domestic business networks (Stark and Vedres 2006). Foreign investors balanced ownership control over cash flows with the need to fit in: they buffered local uncertainties both by trying to legitimate their presence (Zaheer 1995), and by acquiring local knowledge (Kaldor 2002).

Path dependency, objective possibility, and pathways

Nearly two decades after the collapse of state socialism, with the early enthusiasm of social engineering left behind, it becomes clear that multiple processes of social change were at play (Gordon and Klopov 1999; Spicer, McDermott, and Kogut 2000). Critics of the transition approach argued that any social change is composed of multiple processes. As it is often pointed out, countries followed radically different paths in ownership transformation (Frydman, Gray, and Rapaczynski 1996; Gray 1996; Jones and Mygind 1998; Stark and Bruszt 1998). Firms within one economy also followed diverse paths of transforming their ownership structures.

A sequence of events is the raw material to the historical approach to ownership presented in this article. All processes of change leave a sequence trace: heads or tails in a series of coin tosses, a time series of price fluctuations, or an employment career can equally be represented as a sequence. They can not be interpreted in the same way though. There are two key concepts that helps identifying meaningful variation between sequences: path dependency and objective possibility.

A sequence is path dependent if events early in the sequence influence the probability of subsequent events (Mahoney 2000). In a series of heads or tails there is no path dependency, the probability of tails is exactly one half, regardless of the preceding outcomes of coin tosses. In this article sequences are built of ownership structures. Ownership structures, unlike coin tosses, are conditioned on preceding events. A state owned firm might be bought out by managers, but once it was acquired by a multinational, such buyout is highly unlikely. In sequence terms, S (state ownership) often followed by M (management buyout), but F (foreign ownership) is not likely to be followed by M. We would expect to find several sequences that look like this: S-S-S-M-M-M, but few sequences that look like this: F-F-F-M-M-M. A firm that was acquired by its managers (M) is less likely to become owned by a coalition of domestic firms (C), than a firm that is either fully state owned (S), or fully owned by one domestic firm (D). Again in sequence terms: we expect to encounter few sequences of M-M-M-C-C-C, and more sequences of S-S-S-C-C-C, or D-D-D-C-C-C.

In interpreting a sequence as path dependent, we need to take into account objective possibility (Weber and Shils 1949). Objective possibility in historical sociology refers to a judgment that the possibility for an event was present. In the case of our ownership sequences, not all sequences that seem to be locked into a sequence are path dependent. Looking at a sequence of S-S-S-S-S... that runs between 1992 and 1997 might be interpreted as path dependency, a firm being locked into state ownership, since it was objectively possible within that time frame to exit state ownership, as illustrated by several other sequences. But seeing a sequence like that from 1982 to 1987 could not be interpreted as a path dependent sequence: other forms of ownership were not objectively possible in the eighties (for the largest firms at least).

This article analyzes close to two hundred sequences of ownership. It would be difficult to evaluate path dependencies and objective possibilities in the case of each sequence, and it would be impossible to compare these sequences to all other sequences. The first step in analyzing these sequences is to group them into pathways. Pathways are typical sequences, with similar events and similar timing. Pathways of change are best thought of as processes that operate in the sequences of several firms. This provides an opportunity to

bring in developments from historical sociology, first of all the recognition that any process in social change has a temporal structure, with varying direction, speed, and punctuation (Böröcz 1997; Sorokin 1957). A case of historical change is typically an interplay of multiple processes (Sewell 1996), multiple typical sequences of events within a historical case (Abbott 1990; Abell 2001; Bearman, Faris, and Moody 1999; Sztompka 1993).

In this article pathways are operationalized as typical sequences of ownership forms with a characteristic order and timing of changes. Typical-sequence approaches were used previously to reveal institutional logics (Han and Moen 1999), typical situations of action and interaction (Griffin 1993) that either follow a path dependent course or transform structures durably in a typical way (Sewell 1996). These pathways also help us understand how strategies of action and institutionalized scripts interact with changes in the economic environment (Stovel, Savage, and Bearman 1996).

I use optimal matching analysis to identify typical ownership sequences. Optimal matching analysis is a tool to identify pathways, typical sequences according to similarity in the types of events experienced and the temporal structure of the sequence (Abbott 1995; Abbott and Hrycak 1990; Stovel 2001; Stovel et al. 1996). Conjunctions - convergence and divergence of these pathways - make it possible to identify emergent transitions at the macro level. The rapid emergence of ownership forms can be a product of the interplay of two or more pathways that arrive at the same ownership form. The context of pathways is analyzed to amend the limitations of the imagery of social processes implied in optimal matching analysis. Instead of subscribing to an image of processes as walled-off tracks I use dynamic scaling to visualize how pathways converged or diverged. The argument behind this model is that path dependency at the micro level and macro level radical restructuring can co-exist, moreover these processes can be reconciled in a model of social change.

DATA

The data used in this article is the ownership histories of the largest 200 Hungarian firms. These firms were the largest in terms of their revenues in 1999. The original data covers all the changes in the top 25 owners (owners holding the highest proportion of shares) over the entire career of these firms³. The source of this data is the Hungarian registry courts, where firms are required to register all changes in their ownership structure. The sources for the names of the top 200 companies were two commercially available corporate databases. The two 200 company listings did not coincide completely (these commercial data sources rely on self-reported data), the pooled lists yielded 222 companies. Out of this population there were finally 185 companies with analyzable ownership histories. The missing 37 firms had inaccessible files at the registry courts or their ownership records were missing from the files⁴. Beyond ownership histories data were collected on capital and the number of employees for 1995 and 1997 – before and after a key turning point identified from the analysis of ownership pathways. I used the number of employees divided by revenues, and capital divided by revenues as indicators of performance⁵.

The limitation of the data is that it only accounts for firms that have survived to 1999. With this data one can only account for the evolution of the final large firm segment of the economy; pathways that led to extinction can not be included. Thus the negative effects of

lock-in mechanisms in ownership sequences can be underestimated, firms in the sample had to perform well enough to survive.

All changes in ownership are recorded with corresponding dates, which makes it possible to reconstruct firm careers through various forms of ownership. At each instance with a change in ownership, the new set of owners is recorded. These records include the total capital, names, and amount of shares held for each of the largest 25 owners. Owners were categorized into eight types based on their names⁶. Altogether there were 4951 owner names. Only 2% of the names were not classifiable, these owners were excluded from further analysis⁷. The eight categories used for classification are presented in Table 1.

Table 1. about here

Coding ownership forms

For each firm and each month, the dataset records the types of owners and their shares. Let us consider this combination of owners the *ownership form* of the given firm in that given month. The typology of all ownership forms is the ownership space. On the average there were 5.31 ownership forms in a firm's career. These ownership forms are the building blocks for sequence analysis.

The ownership space in the original form is too complex for further analysis, since each of the top 25 owners can belong to any of the eight categories. To make firm careers comparable the number of ownership forms needs to be reduced to a manageable size, with a minimal loss of relevant information. On one hand the ownership space should be detailed enough to enable the distinction of characteristic processes, on the other hand the ownership space should be small enough to enable sequence comparison. The final ownership state space was constructed by classifying all ownership forms by the first, second, and third largest owners⁸. This classification was accomplished qualitatively, that resulted in a grouping of ownership forms into 16 categories⁹, presented in Table 2.

Table 2. about here

IDENTIFYING PATHWAYS

To identify pathways, typical sequences of ownership forms, optimal matching analysis was applied. Optimal matching results in a pairwise dataset of sequence dissimilarity. To find typical sequences from this dissimilarity data, I used Ward clustering¹⁰. The description of these seven clusters in terms of typical ownership forms is presented in Table 3. In the

following these pathways are introduced to interpret the processes, potential path dependencies, and lock-in mechanisms they represent.

Table 3. about here

The first general finding is that ownership sequences follow a few pathways. By reducing 185 sequences to seven typical sequences, 66% of the variance in sequence similarities can be covered¹¹. I conducted simulations that indicate that, if it were possible to switch from any ownership form to any other with equal probability at any point in time, then seven typical sequences would explain less than 5% of the variance in sequence similarities. In another article I analyzed the compromise between variance explained and model detail (Vedres 2004). The simplest models that represent ownership transformation by one narrative can at best account for 7% of the variance in sequence similarities. One could cover one hundred percent of that variance by 185 narratives, but that model would be useless. Seven pathways seem to be a good compromise by explaining two thirds of the variance with a relatively simple model.

The first pathway is the breakup of joint ventures (25.9% of firms). This path is the largest one with a quarter of all firms. A typical pathway starts with an ownership coalition of a foreign firm and a Hungarian firm (ownership form 9) that lasts for about two years. This ownership coalition then dissolves into 100% foreign firm ownership (form 11). The dissolution of foreign-Hungarian owner coalitions was a gradual process from 1991 to 1996. Once the structure of uncertainties change and adaptation to a market environment becomes the dominant challenge, foreign investors buy out their domestic partner to create a wholly owned subsidiary. A partnership can become a liability in a market environment. Protecting proprietary know-how and bringing about negotiated decisions are costly.

The second pathway is about the formation of domestic firm coalitional ownership (12.4% of firms). The typical story in the second pathway is that the Hungarian firm and state ownership coalition (form 3) changes into the ownership of multiple Hungarian firms (form 7). The coalition of Hungarian firms indicates a network form of ownership. This form of ownership persisted throughout the nineties in this pathway. This is an indication of the path dependency of network forms of ownership. After 1995 this domestic inter-organizational network form of ownership does not dissolve – the question is whether this is a result of lock in mechanisms or this network form is also a viable strategy in a market environment.

The third pathway is management buyout (8.6% of firms). The typical story starts with a very short state ownership period – on the average lasting for only six to nine months – then the firm becomes owned by individuals (ownership form 10) – typically managers or employees (with some secondary partners, the state or a Hungarian firm). This is a rather small pathway involving less than a tenth of the firm population. Most of the events here happen in the first years (1990-1993). Being state owned for three months after being transformed to the corporate form and then being taken over by persons suggests a well planned and prepared transition from a socialist enterprise into a privately owned

(management and/or employee buyout) corporation. This personal ownership lasts throughout the entire epoch; there are only some cases where we see foreign financial owners and Hungarian firms becoming more dominant. Though the first owner is a person (manager) or a collective of employees, typically there are significant second and third owners, which indicates that the personal privatization strategy is also a coalition strategy.

The fourth pathway is foreign financial investment (15.1% of firms). It is another privatization pathway, from pure state ownership (form 2) to state and foreign financial ownership coalition (form 14) and then to the dominance of a foreign non-financial firm (form 11). The appearance of foreign financial owners is typically in 1991-93, while the disappearance of state ownership is 1997-98. Here foreign financial investors partner with the state as owners, taking advantage of its guarantees. After the period of institutional uncertainties the state gradually disappears, and then foreign non-financial investors appear. Foreign financial investors pave the way for foreign non-financials.

The fifth pathway is about the evolution of domestic subsidiaries (9.2% of firms). This is a smaller pathway with nine percent of the firms. After a long initial state ownership (about two years on average) one Hungarian firm becomes the owner. The privatization event typically happens between 1995 and 1997. This pathway is in contrast to the second, with multiple Hungarian firms as owners. Contrasting these pathways suggests that after 1995 ownership is possible by a single Hungarian firm, while before that radical uncertainties push firms to rely on multiple ties rather than a single owner.

The sixth pathway is the evolution of foreign subsidiaries (24.3% of firms). It starts with full state ownership, lasting typically until 1995-97. Then there is a wave of partial privatization for non-financial foreigners (a transition to form 4), creating a mix of state and foreign firm ownership. Typically there is one foreign owner, and the state retains only a minority share. After 1997 a number of these firms become fully foreign owned (ownership form 11).

The seventh pathway is about being 100% owned by a local government throughout the whole period (4.3% of firms). The firms here are mostly late starters (1995-96), and mostly public utility firms that were transformed into a corporate form.

OWNERSHIP REGIMES AND TURNING POINTS

In the previous section the focus was on identifying pathways, in this section the context of these pathways are analyzed to identify ownership regimes and turning points between them. Optimal matching analysis makes it possible to identify mutually exclusive groups of similar sequences. Stopping at this stage of the analysis would mean subscribing to an image of historical change with separated parallel tracks, without taking branching and conjunctures into account. The aim of analyzing the context of pathways is to overcome this limitation, and identify branching and joining points, and through that, to identify the structure of time at the macro level.

First, a dynamic scaling method is devised to chart the proximity of pathways across time, and then this timeline of proximities is used to identify periods of radical restructuring from the conjuncture of pathways¹². The result of this analysis is represented in Figure 1.

Figure 1. about here

A proper reading of Figure 1 requires some caution in interpreting the horizontal and vertical axes. The horizontal axis represents the progression of time by two-year moving windows. The vertical axis represents the proximity of pathways regarding their similarities in ownership composition at any given time. The vertical axis is not a predefined coordinate (such as the proportion of state ownership). The best way to understand this axis is to think of it as latitude on a map, while time represents longitude. On this map, a pathway “navigates” closer to another if it becomes more similar to it and more dissimilar to ones that it was previously close to. The meaning of the vertical axis changes (potentially) at each point in time. Interpreting figure 1 to a large part means decoding the changes in the meaning of the vertical axis. By finding these changes, it becomes possible to develop a periodization of the nine years studied. Basically this method is a device to identify the dichotomy that defined a period, rather than accepting dichotomies from teleological narratives. The first question is whether there are clear-cut phases and identifiable conjunctures.

The first ownership regime is defined by state ownership and its private alternatives. In the first regime of ownership, in the first two windows (from 1991 to 1993) there is one major group of sequences in the middle with two outliers on the two opposite ends of the coordinate. The shared feature of the middle group is state ownership. The two outliers (pathway 5 and 6) are two early alternatives to state ownership. Pathway 5 in these years consists of joint venture firms, firms in foreign and Hungarian firm ownership. Pathway 6 on the other end of the continuum is a mix of Hungarian firm and state ownership. These two pathways can be considered two early alternatives of state ownership.

The second, more eventful ownership regime is defined by private organizational coalition ownership versus state ownership. The two organizational coalition pathways (5 and 6) are close together at the top of Figure 1. State ownership forms are at the bottom of the figure. This ownership regime is eroded by major changes in ownership. Joint ventures begin to break up in 1995, leaving firms in full foreign corporate ownership. Several state owned firms are privatized for single foreign firms, and there is a wave of privatization for single Hungarian firms. Joint ventures in this period represented an interorganizational network form of ownership. Interviews with managers of former joint ventures suggest that foreign investors in the early nineties did not think of joint ownership as transitory¹³. It was a transition to another regime that prompted joint venture dissolution.

The last ownership regime is defined by foreign ownership versus domestic ownership. This third regime starts with the 1996-97 window. We see two major clusters of ownership emerging: Hungarian ownership at the top and foreign ownership at the bottom. There are several firms in pathway 3 that become owned by a foreign firm after foreign financial investor ownership. The pathways of former joint ventures, firms privatized for

foreign financial investors and firms gradually privatized for foreign firms will gradually converge to constitute a group of foreign ownership. There are no more major restructurings at the end of the nineties, the pathways in this phase more or less stay parallel. At the end there are three pathways (the first, the fourth, and the sixth) that all represent majority foreign ownership; at the end of the period this is 65% of the firms in our population.

The coalition of two or more Hungarian firms as owners did not dissolve, suggesting that there were causes that outweighed the diminishing need to utilize network ties for shielding institutional uncertainty. After this point it is clear that concentrated ownership is an objective possibility. Since these domestic firm coalitions contain partners of essentially equal status and financial power, probably there were lock-in mechanisms in place that prevented the coalition to transform into single-firm ownership, such that none of the owners was able to buy the other's shares.

PATHWAYS AND PERFORMANCE

Hypotheses

Based on the analysis of pathways and turning points, expectations for performance are formulated below. From the analysis of ownership sequences I inferred that private interorganizational ownership coalitions represented an organizational innovation to cope with uncertainties. Thus for 1995 I expect private coalitional ownership to be more efficient than state ownership. I further expect that there is no difference between the performances of the two variants of these interorganizational coalitions: joint ventures (mixed foreign and domestic organizational ownership coalitions) and domestic firm coalitions. By 1997 joint ventures dissolved, while domestic coalitions did not change. I expect that dissolved joint ventures become significantly more efficient than unchanged domestic coalitions.

Interorganizational network forms remained in place even after the period defined by them. If this form represents a locked in innovation, then I expect that in the relevant period of interorganizational networks this ownership form (that is membership in pathway 2) will ensure high performance, while after the turning point it will lead to inferior performance. Pathway 5 (privatization for a Hungarian firm) becomes owned by a domestic firm after the relevant period of interorganizational network forms. If this pathway represents a later version of the same type of interorganizational networking, I expect that it will lead to inferior performance as well.

The same reasoning applies to managerial ownership (pathway 3, early privatization for persons): managerial takeovers typically happened in the early years of the nineties and managerial ownership did not change for most of the firms until the end of the nineties. If this form of ownership behaves as a domestic coalitional form, then I expect a decline in performance after the period of interorganizational network forms.

The pathway of dissolving joint ventures (pathway 1) seems to be in line with ownership regimes throughout: it can be considered an interorganizational network form in

the mid nineties, and then it becomes concentrated foreign ownership at the end of the nineties. If this pathway represents ownership best adapted to the environment, then I expect this pathway to outperform others, even others with foreign ownership.

Pathways 4, 5, and 6 involved long state ownership. If there are strong legacies of state ownership, I expect the firms in these pathways to have inferior performance. Pathway 7 (local government companies) never exited state ownership, so we can expect that this pathway will have the worst performance.

To test the hypotheses about the consequences of ownership pathways for firm restructuring, I compiled regression models of labor and capital efficiency for 1995 and 1997. In the previous part of the analysis I identified a transition between 1995 and 1997: ownership in 1995 was organized along the dimension of private coalitions versus the state, while by 1997 the main dimension of ownership is foreign versus domestic.

Revised pathways up to 1995 and 1997

To ensure the correct temporal order of ownership forms and performance, I re-run the optimal matching analysis with ownership events up to 1997, and ownership events up to 1995. For estimating the efficiency in 1995 I use ownership sequences up to 1995, while for estimating efficiency in 1997, I use ownership sequences running up to 1997.

The pathways resulting from the revised optimal matching analysis of ownership events up to 1997 are very similar to the pathways found in the full dataset with sequences running to 1999: only four percent of the firms were clustered into different pathways than they were in 1999. The number and interpretation of the pathways in 1997 and in 1999 is the same. This does not mean that no ownership events occurred after 1997, but rather it means that the events after 1997 very rarely affected the classification of ownership sequences; rarely did these events outweigh the distinctiveness of ownership history accumulated between 1991 and 1997.

The pathways identified from the sequences running up to 1995 are considerably different from the pathways in the full time period, with about 21 percent of the firms clustered differently. The most important difference is that privatizations by single Hungarian firms happened after 1995, so there is a sizable pathway of fully state owned firms. The adequate solution is to define a set of pathways that are different from the ones identified in 1997 and 1999. Pathway 1, joint ventures, contains basically the same set of firms. The joint ventures are not dissolved yet. Pathway 2, Hungarian firm coalitions, is not affected; this pathway contains the same set of firms as the corresponding pathway in 1997 or 1999. Pathway 3, early privatization by persons is also not affected, it is a pathway with the same set of firms. The 4th pathway, gradual privatization with foreign financial investors, contains approximately the same set of firms as the corresponding pathway in 1997 or 1990. The ownership form in this pathway is a state-foreign financial coalition in 1995. Pathway 5 is about state ownership. This pathway contains the firms that by 1997 become pathway 5 and 6. In 1995 these firms are still in full state ownership.

OLS regression models

To increase the reliability of estimating differences in performance, I use two performance measures: labor and capital efficiency. I use the consistency of coefficients across these two measures to estimate the robustness of the results. Table 4 displays the results of the regression analysis. Considering all four models, all collinearity diagnostics were within conventional thresholds. Considering both models, the maximal variance inflation factor was 1.876 and the largest correlation coefficient in absolute value between independent variables was 0.381 in 1997, and 0.433 in 1995.

Table 4. about here

The first set of variables represent the pathways up to 1995, while the second set of variables represent pathways up to 1997. The reference category for both sets of pathway variables is the pathway of joint ventures. In 1995, firms in this pathway are owned by a foreign and a Hungarian firm, in 1997 the joint ventures were largely dissolved, and the owner is a foreign firm. This reference pathway has the best performance in both 1995 and 1997. In general, the coefficients of the two performance measures, labor and capital efficiency are consistent across all pathways. There is only one pathway in 1995 with a significant coefficient in labor efficiency and an insignificant coefficient in capital efficiency. In 1997 the performance measures of all pathways are consistent.

Results

In 1995 the pathway of joint ventures achieved the best performance. There are two pathways that were not significantly different from joint ventures: 2. Hungarian firm coalitions and 3. Early privatization for persons. This indicates that the ownership of organizational coalitions was a viable solution to buffer uncertainties. The fact that some of the organizations in these coalitions were foreign firms did not result in significant advantage in performance. The performance of firms with personal ownership was comparable with the performance of organizational coalitions. These firms were privatized early, typically by managers, within the framework of “spontaneous privatization”. The high performance of these firms might be due to the selectivity of this early privatization process – managers decided on their insider information about performance whether to become owners. The performance of firms in the 4th pathway – Gradual privatization with foreign financial investors – were significantly lower in terms of labor efficiency. Capital efficiency here was not significantly lower than in the best performing pathways. This might reflect the concern of financial investors with capital, rather than labor efficiency. State owned firms (pathway 5.) and local government owned firms (pathway 6.) have significantly lower performance along both measures.

In 1997 dissolved joint ventures were the performing pathway (pathway 1.). The performance of firms in Hungarian firm coalition ownership was no longer comparable to the joint venture pathway. These firms – still owned by organizational coalitions – had

significantly worse performance along both measures. This indicates that these firms became locked into an ownership form that buffered them from uncertainties and ensured performance in the earlier period of transformation, but lost its advantage in the later phase of market adaptation. The 3rd pathway – with personal ownership – maintained its high performance, and was not significantly different from the dissolved joint ventures. The 4th pathway of gradual privatization with foreign financial investors lost its labor efficiency disadvantage over the dissolved joint ventures, by 1997 the performance of firms in this pathway is not significantly different from the reference category. The pathway of state-owned firms that was identified in the ownership data running up to 1995 is now split into two pathways, 5 and 6. The firms in the 5th pathway became privatized by a single Hungarian firm. The performance of these firms is not significantly different from the dissolved joint venture pathway. In terms of performance, these firms do not carry the legacy of state ownership. A typical firm in pathway 6 was gradually privatized by a foreign firm. The performance of these firms is still significantly below the reference category of dissolved joint ventures. The last pathway, pathway 7, contains local government owned firms. These firms have significantly lower performance measures than the reference category.

Larger firm size means higher labor efficiency in both 1995 and 1997. For capital efficiency however, larger size means lower efficiency in 1995, and there is no significant relationship between size and capital efficiency in 1997. Industry categories differ in performance. The only industry category that consistently outperforms the others is wholesale. This is in line with expectations about merchant capitalism: firms that engage in trade outperform others. However, manufacturing firms do not seem to be disadvantaged, and there is no performance advantage at financial firms. Geographical location is not an important predictor of efficiency: the only significant difference between firms located in Budapest and the firms located outside the capital was in 1995 in terms of capital efficiency. Firms in Budapest had slightly higher capital efficiency in 1995 than firms in the rest of the country.

The expectation about the declining performance of interorganizational network ownership is supported by the performance models. Pathway 2, Hungarian firm coalitions seems to represent a locked-in organizational innovation. Firms in pathway 5 that were privatized by a Hungarian firm are not disadvantaged in terms of performance. This form of ownership is different from the coalitional form. This suggests that it is the coalition of domestic firms that locks firms in. The relatively equal standing of these coalition partners might prevent the coalition from dissolving. While the coalition effectively buffered firms from postsocialist uncertainties, it was not the right organizational form to restructure firms for a market environment.

Managerial ownership (in pathway 3) did not mean a disadvantage in performance at any time. This performance advantage was maintained throughout the period, suggesting that managers as owners were able to adjust to a market environment. The pathway of joint ventures (pathway 1) performed best both in 1995 and 1997. The firms in this pathway had the advantage of being embedded in an interorganizational network in the most uncertain years of postsocialism, and later a single foreign owner provided the capital for reorganizing for a market environment, not having to negotiate with partners in ownership. Legacies of state ownership faded after privatization. Firms privatized by managers, and by a Hungarian firm, are not disadvantaged in terms of performance. The late privatization for foreign firms

was probably too late for performance improvements to become visible. Firms in local government ownership – a form of state ownership constant throughout the period – are the least efficient in both 1995 and 1997.

CONCLUSIONS

The analytic strategy of this article to identify legacies and path dependencies proceeded by three steps: First typical sequences of ownership forms were identified. The first finding here is that seven pathways can represent two thirds of the variance in the 185 sequences, as opposed to the five percent that we would expect if firms were free to choose any ownership form. Ownership transformation is highly susceptible to path dependency. The question is then, whether some pathways become locked in, making firms unable to navigate new environments. Interorganizational network forms of ownership were candidates for such lock-in mechanisms.

In the second step turning points and ownership regimes were identified at the macro level. I found a key transition from a regime defined by the duality of state and networked ownership to a regime with foreign and domestic ownership. This transition coincided with a turning point suggested by the literature: the end of postsocialist transformations and the beginning of a consolidated globalized market economy. Relating pathways to this turning point made it possible to formulate expectations about lock-in mechanisms.

In the third step of the analysis I estimated the differences in performance between pathways before and after the turning point to evaluate these expectations. Network forms of ownership locked firms in, contributing to decreasing performance. Joint ventures were bought out by the foreign partner, and the firms in their ownership retained their edge in performance. Legacies of state ownership faded in all pathways, except firms most recently privatized by single foreign firms.

Understanding historical change is inevitably hampered by temporal proximity to the events studied. Privatization, marketization, globalization are all processes that “make sense”, through their deep saturation in the public discourse. A historical sociology of the French revolution can more easily be removed from public discourse of the time and thus the grand processes and miraculous forces proposed as explanations by contemporaries. The approaches developed in historical sociology thus incorporate a focus on agency and the dynamics of tangible relations more naturally. In analyzing the near past, one needs to overcome the temptations of accepting grand narratives to organize the understanding of processes.

Postsocialist time was not a smooth transition from state to private ownership, or from domestic to foreign ownership, it was rather structured by emergent transitions. The structuring of time is closely related to the fact that relational structures provide stability in the face of uncertainties. While stability provided by network structures was probably welcomed by firms in the early years of postsocialism, to count on stability in itself can be a dangerous strategy in uncertain times. Forming embedded ties to hedge uncertainties creates new uncertainties as well.

Are uncertainties thus merely negative side effects of social change? Or are they the key ingredients to bring about lasting changes? Firms experiment with relational structures in part because they are pressed by uncertain environments, but also partly because there are other firms in their environment in a similar situation also seeking network partners. With the passage of high uncertainties this pool of potential network partners decreases, leaving fewer opportunities for organizational innovation. The question is whether a future turning point will redirect processes towards network forms again. We already see signs of foreign-built ownership networks emerging in the early two thousands (Stark and Vedres 2006). Global competition might make networks assets again.

Appendix A: Defining ownership forms

The classification of ownership forms was accomplished along the following principles: First, any ownership form with the first owner being clearly dominant (that is the constellation belonged to the “dominant owner” cluster in the clustering outlined above) was classified by the first owner. An example of this is a foreign firm as the dominant owner, which is the number 11 ownership form that is denoted as Ff-00-00. This notation indicates that the foreign firm is the first owner, and that the second and third owner positions can be considered null, without a significant owner. Ownership states 1, 2, 6, and 11 are about having a dominant owner.

The second rule was that ownership forms should distinguish coalition types involving the three main types of actors (Hungarian firms, state, and foreigners) without creating overly infrequent categories. Such coalition categories in this case are the mixes of state and private ownership (ownership forms 3, 4, 5 and 14), coalitions of Hungarian firms and other Hungarian firms (form 7), Hungarian firms and persons (form 8), and Hungarian firms and foreign firms (form 9). While persons are hardly ever dominant owners of large firms, it is interesting to distinguish those coalitions where persons (in all of the cases Hungarian persons) are holding the largest block of shares (form 10). There are coalitions of foreign firms with other foreign firms (form 12), and foreign firms with others (form 13). Foreign financial investors are never dominant owners; however it is interesting to distinguish those ownership states where foreign financial investors are in the first position with the state (form 14), or others (form 15) in the second and third positions. Finally there were some cases that were not classifiable in this scheme (amounting to only 18 occurrences).

Appendix B: Optimal matching analysis

Optimal matching analysis is a tool to measure sequence resemblance by finding the optimal (cheapest) way to transform one sequence into another (Abbott 1995). The algorithm can substitute, delete or insert elements of the state space in a sequence to match it to a target sequence. Each of these operations (substitutions, insertions and deletions) has its “costs”. The cost of substitutions are usually specified for each dyad of the state space. The most common way to establish this cost structure is to make it inversely proportional to the frequencies of the transitions between states (the transition matrix). The cost of an insertion equals the cost of a deletion. This cost is commonly referred to as the indel cost, and there are various suggestions about the relation of the indel cost to the substitution costs, usually it is set to equal to the highest substitution cost. Recording how costly it is to turn each sequence into each of the other sequences thus results in an n-by-n matrix where n is the number of sequences – firm ownership histories in this case (Sankoff and Kruskal 1999). In this matrix x_{ij} denotes the distance between sequence i and j (the total “cost” of transforming i into j). This distance is zero if the two sequences are identical. The distance is larger if the two sequences contain more unique events relative to one another (creating a higher need for substitutions), or the difference in length is greater between the two sequences (requiring many insertions or deletions to align them).

I have created the substitution cost matrix such that those ownership forms that follow one another relatively frequently in firms histories are cheap to substitute. I have created the substitution cost matrix by first symmetrizing the transition matrix by taking the sum of x_{ij} and x_{ji} . Then this matrix was reversed by subtracting x_{ij} from the maximal symmetrized value. The resulting cost matrix was symmetrical and costs ranged from zero to 19. The indel cost was set to the maximal substitution cost, so that the algorithm makes a clear distinction between two sequences with the same ownership forms, but with different ordering. In natural sciences optimal matching is typically used for comparing sequences that are considered similar even if large chunks of the sequence follow in a different order. This is the case for genome sequencing, or geological layer sequencing (Sankoff and Kruskal 1999). The parameters of optimal matching needs to be adjusted specifically to temporal sequences, where ordering is a crucial aspect of temporality. I have used OPTMAT (Abbott and Prellwitz 1997) to accomplish optimal matching of sequences. After running the optimal matching algorithm the resulting distance matrix was clustered by a number of algorithms. Out of these Ward hierarchical cluster analysis (Ward 1963) produced the best fit. The R-squared of the Ward seven cluster classification (the variance explained by the seven clusters in the original 185 by 185 element distance matrix) was 0.667. The R-squared of the other clustering algorithms were as follows: CONCOR: 0.623, complete link hierarchical clustering: 0.456, average link hierarchical clustering: 0.353, and single link hierarchical clustering: 0.128. A seven cluster classification captured typical sequences best (a finer grained classification produced variants of the same major types of sequences, while smaller number of clusters collapsed pathways with different temporalities).

After the cluster analysis I tested the key aspects of the robustness of this model. The first question that I tried to answer is that how robust is the optimal matching analysis of this dataset is for changes to the indel cost. I found that changes to the indel cost results in little change to the distance matrix. With any unit change to the indel cost (say 18 instead of 19 or

10 instead of 9) the correlation between the new distance matrix between sequences and the original (without changing the indel cost) is always greater than 0.990. Changing the indel cost from 19 to 9 results in a correlation of 0.831 between the two distance matrices. The relationship between a unit change in the indel cost and a unit change in correlation between the resulting distance matrices is linear (with R squared equal to 0.98).

Appendix C: Dynamic scaling analysis

The first step in charting pathways is to measure their proximity to one another at each point in time. I measured this proximity over two year periods that I shift year by year as a moving temporal window. Two pathways are proximate in a two-year window if many firms in them have the same ownership form. Proximity was measured by the correlation of pathways across the profile of the frequencies of the sixteen ownership states, thus obtaining time series of correlations between pathways (Isaac and Griffin 1989). A high correlation indicates that firms in two pathways had mostly the same ownership form over a two year window.

To represent the varying proximities of pathways to one another I used multidimensional scaling. This approach is referred to as dynamic scaling (Cox and Cox 2000), the general idea is to use a spatial diagram to depict pattern shifts in time series or panel data by time (Raveh 1981; van der Heijden and de Leeuw 1989). There are altogether eight time windows with measures of the proximities of pathways. I omit the last, seventh pathway from this analysis, because there were no ownership events there: firms were owned by local governments throughout, and there was very little local government ownership in any other pathway.

These eight correlation matrices are then represented by multidimensional scaling as one dimension. I use the MINISSA non-metric multidimensional scaling algorithm with correlation matrices of pathways over a two year window as input. I reduce the dimensionality of a correlation matrix to one dimension. Typically multidimensional scaling is used to derive two dimensions to obtain a two dimensional space, but the method can reduce the dimensionality of a system of proximities to any number of dimensions. This means that for each of the eight time windows the seven pathways are represented along one coordinate, with proximate pathways sorted and placed closer together in proportion to their ownership similarity. If we stack these one-dimensional representations along a time axis, we can represent pathways as winding paths, sometimes approximating each other, sometimes moving apart.

To be able to stack the single dimensional scaling diagrams after one another these diagrams were adjusted to their temporal neighbors. Since scaling is invariant for mirroring and resizing (that is multiplying the coordinate with a constant) coordinates were mirrored to match the preceding time point as much as possible. Coordinates were resized to range from -1 to 1. The average stress was 0.181, while the average R-squared (the proportion of the variance in the eight correlations matrices explained by a single dimension) was 0.444.

Footnotes

¹ Hungary received \$ 1,655 foreign direct investment per thousand inhabitants between 1989 and 1998; the second was Czech Republic with \$ 1,119, and the third was Estonia with \$ 1,106 (Deichmann et al 2003).

² For a detailed timeline of legal changes in Hungary see Stark and Bruszt, 1998.

³ Recording the top 25 owners is sufficient for covering ownership. The average of the shares of these owners combined is 92 percent. Ownership in Hungary is much more concentrated than in the US: the median share of the largest owner is 85 percent, while the median in the US for a comparable population is around five percent (Crama et al 2000).

⁴ The missing firms are not significantly different from the rest regarding size (F-test $p=0.141$) or industry (chi-square test $p=0.366$).

⁵ The distribution of revenues and measures of labor and capital efficiency were skewed; in the regression models I used their logarithms that were normally distributed.

⁶ In case of ambiguous names Internet searches for the corporate website and typical patterns of ownership was used to decide the type or code as miscellaneous. Most of these ambiguous names were foreign organizations, where decision needed to classify the owner either as financial or non-financial owner.

⁷ Most unclassifiable owners were unknown abbreviations and foreign organizations with ambiguous or heavily misspelled names. The excluded names represented small portions of

ownership, so firms were not discarded from the dataset because of unclassifiable owner names.

⁸ Since ownership was highly concentrated in Hungary, using only the top three owners means little loss of information.

⁹ For details about how this coding was accomplished, see Appendix A.

¹⁰ See Appendix B for details of optimal matching analysis.

¹¹ The R-squared is calculated as a square of the correlation coefficient between the original sequence distance matrix, and the predicted sequences distance matrix, where cells are substituted by cluster averages.

¹² For details about the dynamic scaling analysis see Appendix C.

¹³ When I asked about motivations of forming a joint venture, one director of a manufacturing firm pointed out: “Don’t be a-historical. We didn’t know in the early nineties that it would ever become possible to operate without domestic joint venture partners. Changes in the economy since then were profound, unforeseeable in the early nineties.”

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Tables

Table 1. Types of owners. N indicates the total number of instances such type of owner appears (there can be multiple instances for the same firm and same time).

Code	Owner type	N
St	State Privatization Agency (SPA)	290
Os	Other state (e.g. ministries)	77
Lg	Local government	798
Hf	Hungarian firm	1336
Hp	Hungarian persons	1429
Fn	Foreign non-financial firm	687
Ff	Foreign financial investor	263
Fp	Foreign person	37
	Total:	5060

Table 2. The space of ownership forms.

Code	Label of ownership form	Owners (first–second–third) ^a	N
1	Local government dominant	Lg–0–0	19
2	State dominant	St–0–0	115
3	State and Hungarian firms	St–Hf– <i>x</i> , Hf–St– <i>x</i> , Hf–Hf–St	34
4	State and foreign non-financial firm	St–Fn– <i>x</i> , Fn–St– <i>x</i> , Fn–Os– <i>x</i>	51
5	State and other	St– <i>x</i> – <i>x</i> , Os– <i>x</i> – <i>x</i>	33
6	Hungarian firm	Hf–0–0	61
7	Hungarian firms	Hf–Hf–Hf, Hf–Hf– <i>x</i>	62
8	Hungarian firm and persons	Hf–Hp– <i>x</i> , Hp–Hf– <i>x</i>	44
9	Hungarian firm and foreign non-financial firm	Hf–Fn– <i>x</i> , Fn–Hf– <i>x</i>	87
10	Persons as first owner	Hp–Hf– <i>x</i> , Hp–St– <i>x</i> , Hp–Hp– <i>x</i>	66
11	Foreign non-financial firm	Fn–0–0	225
12	Foreign firms	Fn–Fn–Fn, Fn–Fn– <i>x</i> , Fn–Ff– <i>x</i>	68
13	Foreign non-financial firm and others	Fn– <i>x</i> – <i>x</i>	23
14	Foreign financial investor and the state	Ff–St– <i>x</i>	40
15	Foreign financial investor and others	Ff– <i>x</i> – <i>x</i>	36
16	Miscellaneous	Miscellaneous	18
	Total:		982

Note. a: Abbreviations indicate type of owner from Table 1. Triplets of abbreviations represent the top three owners in decreasing order of their shares. A zero in the second or third position indicates that there is no owner in that position. An *x* is a wildcard that indicates an owner that creates a combination not classified elsewhere.

Table 3. Pathways of ownership transformation.

Pathway	N	Percentage	Typical sequences
1. Dissolving joint ventures	48	25.9%	9-11
2. Hungarian firm coalitions	23	12.4%	7-9, 3-7
3. Early privatization for persons	16	8.6%	2-10
4. Gradual privatization with foreign financial investors	28	15.1%	2-14-11
5. Privatization for a Hungarian firm	17	9.2%	2-6
6. Late gradual privatization for a foreign firm	45	24.3%	2-4-11
7. Local government company	8	4.3%	1
Total:	185	100.0%	

Table 4. Unstandardized regression coefficients of logged labor and capital efficiency in 1995 and 1997.

	Efficiency in 1995		Efficiency in 1997	
	Labor	Capital	Labor	Capital
<i>Pathways up to 1995^a</i>				
2. Hungarian firm coalitions	-0.179	-0.162	—	—
3. Early privatization for persons	-0.129	0.041	—	—
4. Gradual priv. with foreign financial investors	-0.272*	-0.214	—	—
5. State owned	-0.325*	-0.247*	—	—
6. Local government company	-0.432*	-1.077*	—	—
<i>Pathways up to 1997^b</i>				
2. Hungarian firm coalitions	—	—	-0.188*	-0.288*
3. Early privatization for persons	—	—	-0.167	0.159
4. Gradual priv. with foreign financial investors	—	—	0.035	-0.182
5. Privatization for a Hungarian firm	—	—	-0.061	0.047
6. Late gradual privatization for a foreign firm	—	—	-0.292*	-0.246*
7. Local government company	—	—	-0.269*	-1.080*
<i>Firm size</i>				
Log of revenues	0.157*	-0.115*	0.109*	0.025
<i>Industry^c</i>				
Energy	-0.219	-0.553*	-0.102	-0.507*
Mining	-0.656*	-0.937	-0.375	-0.711
Chemical	-0.099	-0.205	0.092	-0.165
Steel, metallurgy	-0.150	0.818*	-0.136	0.248
Heavy industry	-0.158	-0.104	-0.021	-0.027
Light industry	-0.097	-0.312	0.136	0.016
Wood, textiles	0.052	-0.206	0.043	-0.222
Construction	-0.154	0.198	-0.014	0.326
Wholesale	0.534*	0.359*	0.503*	0.332*
Retail	-0.054	0.161	-0.288*	0.039
Transportation	-0.418*	-0.046	-0.177	-0.006
Finance	-0.181	0.152	-0.329*	0.134
Services	0.104	-0.222	-0.159	0.144
<i>Location</i>				
Budapest headquarters	0.078	0.219*	0.048	0.116
Constant	-0.319	1.898*	0.256	0.675
Adjusted R ²	0.353	0.334	0.380	0.249
F	4.792*	4.710*	5.462*	3.658*
N	140	149	154	169

Notes: a: pathway 1. joint ventures is the omitted category, b: pathway 1. dissolving joint ventures is the omitted category, c: agriculture and food industry is the omitted category.

Figures

Figure 1. Dynamic scaling of pathway proximities.

