Testing Narratives of Postsocialism:
Transition and Sequence Approaches to the Ownership Histories of the Largest
Hungarian Corporations, 1991-1999*

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abstract

Postsocialism is typically framed as transition that represents an a-temporal, unilinear and teleological model of social change. This paper evaluates this logic using firm level event data of ownership changes. I argue that the temporal structure of transition models is insufficiently simple and has a very limited explanatory power when contrasted with event data. The poor fit of transition models is due to the depiction of changes as a single process, answering the question of "what has happened" by constructing a giant event. An alternative model of change with multiple pathways is proposed that utilizes optimal matching analysis of sequences to identify typical firm ownership careers. I also argue that a multiple process model is not only fitting better to the data but it provides the opportunity to formulate a historical narrative of change that avoids teleology by addressing path dependence and contingency, conjunctures, and the trajectory and role of intermediary forms. I propose the reinterpretation of transition as an emergent concept. A moving window scaling approach is proposed to visualize the changes in the directions of the processes identified to aid establishing a new narrative line of macro-level change.

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Postsocialism in Eastern Europe is a key area for the sociology of economic and social change, still the models applied are overwhelmingly a-historical. Postsocialism is typically framed as a *transition*: an a-temporal, singular, macroscopic and grand-narrative guided switch from one state of the society into another. This paradox of a-historicism was critiqued by proponents of a *transformation* model (Stark 1990; Stark 1992; Stark 1996; Stark and Bruszt 1998) and most recently the quest for temporally structured and non-teleological historical models for postsocialism became the focal point of the debate (Böröcz 2001; Róna-Tas 1998; Stark and Bruszt 2001). The contribution of this paper lies in elaborating a critique of, and providing an alternative to transition models based on empirical performance, and not on a theoretically guided dismissal of historicism and teleology.

I argue that it is not primarily the teleological aspect of transitions models that render them inadequate to capture social change, but it is the narrative structure of these models that is ill suited to prolonged and interwoven processes of economic change. Fourteen years into the epoch of postsocialism and almost fourteen years of unsettled debates in social science, it is plausible to hypothesize that changes in East Europe unfolded as prolonged and interwoven processes (Gordon and Klopov 1999; Spicer, McDermott, and Kogut 2000). I propose an alternative narrative model of macro scale transformation that is built from temporally structured pathways of change as meso-level social formations derived from micro level event sequences. The aim is however not to deny the possibility of profound social change. The alternative narrative model presented here is designed to enable the recognition of emergent transitions from the conjunctures of multiple processes rather to postulate a transition built into the narrative model, the strategy of narration itself. The aim of this paper is to test the empirical performance of both transition models and a multi-process transformation model against the same ownership event data.

The empirical case of this paper is the Hungarian large firm sector. This population of firms was claimed to be subject of three major kinds of transition processes. The first transition is privatization, the migration of ownership from the state to private entities. The second is recombination, the emergence of network forms of property: the morphing of state ownership into a corporate ownership network. Although this narrative was formulated to counter transition narratives (Stark 1996), in its original form it still had a single process and presentist narrative structure. The third process is globalization: the recognition that at the

end of the nineties the majority of the largest firms in Hungary are fully or mostly foreign owned. In this paper I outline a model that – by moving away from the transition logic – is able to represent all three processes in a coherent narrative of change. I suggest replacing the presentist question of *what has happened* by a temporally structured narrative of path dependencies and path conjunctures, transforming the case of postsocialism into a case for historical sociology.

This paper presents an analysis of the ownership events the 200 largest Hungarian firms experienced, those 200 firms that were the largest in terms of revenue in 1999. These firms now provide two thirds of exports, half of the GDP and third of employment. Ownership records were obtained from the official archives of the Hungarian registry courts and collected in a dataset of complete ownership histories with a monthly time resolution. The same ownership history dataset is used to operationalize both transition models and a multiple path transformation model.

The paper proceeds the following way: First I outline narratives forms for postsocialist change. Then second, the data is described. After this, third, transition hypotheses are operationalized in terms of expected event patterns and the explanatory power of these hypotheses is tested against actual event data. Then fourth, an alternative multiple path model is built from the typical ownership sequences of individual firms. The explanatory power of this model is tested in the same fashion as in the case of transition hypotheses. After this, fifth, an alternative narrative of property restructuring is presented from the context of parallel processes. Conclusions are drawn about the competing narratives about property change in Hungary, and about the future benefits of a sequence approach to social and economic change in general.

NARRATIVE FORMS FOR MODELS OF CHANGE

Historical sociology underwent a major transformation to place events, the temporal structure of social processes at its focal point, departing from grand narrative guided teleological narratives (Sewell 1996b; Tilly 1984). Temporally structured narrative explanations have become a central element of the methodological strategies of historical sociology over the last decade (Abbott 1992; Calhoun 1998; Griffin 1995; Mahoney 1999; Somers 1998). The ambition

of this paper is to bring the developments of historical sociology to the case of postsocialism[1].

The paradox of studies of postsocialism is that while the case is declared highly relevant for the study of social change, the typical framework to study it is inherently a-historical. The framework of transition as an ideal type first of all lacks structured time, it collapses time into an A-to-B switch, where A and B are derived in a teleological way from grand narratives of democratization or the triumph of capitalism (Böröcz 2001; Nelson, Tilly, and Walker 1997; Stark 1996). Leaving the motivating grand narratives and teleology of transition models aside, I suggest a focus on the narrative structure of these models. These narratives are about a single *giant event* of transition that is built from two cross sections, A and B of society. Transition narratives are unilinear, there is only one switch in the narrative and there are no alternate events or paths (Stark and Bruszt 2001). In the absence of a temporal structure, studies in the transition framework keep posing questions of what has happened. Eric Hanley and his co-authors (Hanley, King, and Tóth 2002) operating within this framework feel confident to criticize David Stark's conclusions drawn from data collected in 1994 (Stark 1996) with their data from 1997. The switch of postsocialism for them has already happened (presumably before 1994), the task is to find support for hypotheses in the A-to-B switch genre. The aim of this paper is to move away from the *presentism* of what has happened and formulate models that open up the temporal dimension compressed in A-to-B switch narratives to make the unfolding of change the focus of the analysis.

Historical sociology provides conceptual elements to build a model that opens up the temporal dimension to formulate new models of postsocialist social change. The most important of these is the concept of the *event* as the unit of analysis (Abbott 1990; Abbott 1992). I propose to shift focus from a single giant event to the hundreds of ownership events the largest firms in Hungary have experienced. As a fundamental shift I propose a new way of building these events together: instead of aggregating them into synchronous macroscopic cross sections I propose to build firm level sequences (Abbott 1995). To chart social change with data on firms or individuals one needs to bridge the chasm between the micro and the macro level. For transition models this bridge is built by an aggregation of individual level phenomena into cross sections and then formulating a macro level giant event as a sequence of two cross sections. It is this cross sectional aggregation strategy that is in the sharpest contrast with the aim to explain social change (Böröcz 2001; Emirbayer 1997; Tilly 1984; Tilly 1997). To replace cross sections

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[1] It might seem an odd enterprise to think about the last decade in East Europe as a historical case. However, thinking in terms of social time rather than calendar time, the fast pace of changes in this region over the past decade justify a historical approach.

and regain temporal structuring in creating the bridge between the micro and the macro level the key is the meso level concept of *pathways.*

A pathway is a typical sequence of events. In a narrative of change there can be multiple pathways, multiple typical sequences of events, multiple processes of change (Abell 2001; Bearman, Faris, and Moody 1999; Sewell 1996a; Sorokin 1957; Sztompka 1993). In their book, "Postsocialist pathways" David Stark and Laszlo Bruszt (Stark and Bruszt 1998) propose the idea of pathway as a unit of analysis for studying postsocialist change. Stark and Vedres outlined a similar approach to identify pathways in the transformation of the business and political networks of the largest Hungarian firms (Stark and Vedres 2001). Critics of the transition logic often point to the multi-process nature of social change. However, they typically equate multiple processes to the transformation of various fields or areas of society (such as political elites, economic institutions or organizational structures). Thus, their critique concerns the image of society (the cross sectional dimension) inherent in transition views: typically these critics propose a finer grained cross sectional dimension rather than a more elaborate temporal model. The simplest recognition along this line is that instead of one transition a political and an economic transition needs to be distinguished: the change of political elites, rules and laws follows a more rapid trajectory than economic restructuring (Burawoy 2001; Melich 2000; Oberschall 1996; Parish and Michelson 1996). A more refined approach (Szelényi and Kostello 1996) takes power, culture and organizational forms also into account. The recognition of a need for more complex multi-process model of social change is an important step away from the transition logic. However, it is only a small step, the present approaches to multiple processes usually provide a fractal reproduction of the transition logic within domains of society. The utility of the meso level pathway concept is that it regains the multiple temporalities in the micro level firm histories as much as possible while reduces the complexity of the model with its temporality, branching and sequencing (Böröcz 1997; Sztompka 1993), and it conforms to the widely used sociological notion of a process as a meso level concept.

The multiple path model presented in this paper is operationalized inductively from firm ownership sequences and not from a-priori knowledge about sub-sections of this field. To accomplish this I employ optimal matching analysis to distil typical ownership sequences. Optimal matching analysis is a tool to identify paths or typical sequences according to similarity in the events experienced and the temporal structure of the sequence (Abbott 1990; Abbott 1995; Abbott and Hrycak 1990; Stovel 2001; Stovel, Savage, and Bearman 1996). This approach makes the recognition of parallel running typical sequences possible (I will present the method in detail later).

I will use pathways as the raw materials for a new narrative model of change – I think of these pathways as the temporally connected event sequences that a coherent narrative can be built from (Franzosi 1998; Haydu 1998; Munz 1977). To build a model of this raw material I build on the notion of path dependence (Arthur 1989; David 1985; Goldstone 1998; Mahoney 2000), and the concept of conjuncture (Bruszt 2002; Griffin 1993; Paige 1999). Path dependence arguments focus on a single path to show how initial contingent events are locked in by increasing returns or a sequence of reactions (Mahoney 2000). Conjuncture means a focus on at least two sequences of events that that intersect in a sense that they arrive at the same state or event at the same time. Conjuncture arguments acknowledge that there are multiple sequences (of possibly path dependent processes) running along that can affect each other – triggering new chains of path dependencies or breaking path dependencies of the past.

Historical sociology operates with narrative models that are most accessible to visual intuition: paths of change that diverge, or converge to conjunctures. Sequence analysis is a valuable tool to distil pathways; however it needs to be complemented by other methods to address this divergence or convergence, the directionality of pathways. Optimal matching analysis itself provides no notion of the dynamics of the distance of paths (clusters of sequences), put in the visual language of narrative models: it depicts change as if it were composed of walled-off tracks. To complement optimal matching analysis dynamic scaling is used to chart how pathways approximate each other or diverge in time. This analysis will serve as the basis for making inferences about conjunctures.

The quest for alternative models to replace transition narratives does not entail by any means a denial of the possibility for fundamental change in East Europe (Stark 1992). It would be a misunderstanding to interpret this paper as an attempt to refute that private property became a prevailing form, and that it replaced state ownership that was practically the only form of ownership for the largest firms in East Europe at the beginning of the nineties. Similarly, I do not suggest challenging that foreign ownership drastically increased over the last decade, or that network forms of ownership were widespread. On the contrary, I will work on incorporating an understanding all of these major and radical shifts. It is the puzzle that we find evidence for more than one of these radical restructurings that prompted me to engage in the analysis of temporality.

While I argue against a temporally un-structured model of change, I do not aim at eradicating the metaphor of transition from my analysis. I rather suggest a reinterpretation of transition as an emergent phenomenon to recognize rather as a presupposed narrative shape. One inspiration for such a reinterpretation for sociology come from evolutionary biology. Biologists interested in evolutionary transitions modeled mutation dynamics to challenge beliefs that radical transitions

in evolution presuppose radical changes in the environment. Experiments have provided evidence that swift transitions can emerge from the dynamics of mutations themselves that produce periods of drift reaching thresholds and leading to jumps (Fontana and Schuster 1998). John Padgett has built on these ideas from biology to model the swift and radical changes brought by the renaissance in Florence (Padgett 2001; Padgett and McLean 2002).

How does the aggregation of micro sequences into meso level pathways help in integrating these radically different changes? A basic and crucial assumption is that the meaning of ownership states is not known a-priori by the guidance of a grand narrative, but rather it is read from the context of the sequences of events. The same firm level transitions can take on radically different meanings in each pathway. Let us illustrate this point with an example. Consider the following three event sequences in table 1:

Table 1. about here

The ownership state of interest in this example is the coalition of a Hungarian firm and a foreign firm. In the first sequence this state follows state ownership. In the context of this sequence the coalition of a Hungarian and a foreign firm represents private ownership. In the second sequence the ownership coalition of interest to us is followed by the ownership of a single foreign firm. In this sequence context our coalition means partial foreign ownership that becomes full foreign ownership. In the third sequence the first ownership state is the ownership of two Hungarian firms followed by the coalition in focus. In this context the coalition of a Hungarian firm and a foreign firm means a reshuffling organizational owner coalition, a new constellation of organizations as owners. In a transition model ownership states can only have one meaning.

My strategy in this paper is to take the debate about what temporal structure suits a model of postsocialist change to the ground of empirical testing. To accomplish this I operationalize both transition models and my transformation model using the same dataset of firm level ownership events. There are three major types of transition hypotheses that I operationalize: privatization, recombination, and globalization. Privatization transition narratives are the most widespread, most generic form of transition hypotheses about ownership. The giant event here is formulated as a transition between state ownership and private ownership (Lipton and Sachs 1990; Sachs, Zinnes, and Eliat 2000). The hypothesis of recombination tells a narrative switch from state ownership to networks of inter-organizational ownership (McDermott 2000; Stark 1996; Stark,

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Breiger, and Kemeny 1999). Globalization hypotheses assume a switch from domestic ownership to foreign ownership.

In the following I outline the data that I will use to test these transition hypotheses and to formulate an alternative multi-pathway narrative model.

DATA

The data used in this paper is the ownership histories of the largest 200 Hungarian firms. These firms were the largest in terms of their gross revenues in 1999. The data covers all the changes in the top 25 owners (owners holding the highest proportion of shares) over the entire career of these firms.

The source of this data is the Hungarian registry courts, where firms are obliged to register all changes in their ownership structure. The source 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 200 lists yielded 222 companies. Out of this population there were finally 185 companies with analyzable ownership histories. The missing 37 firms (17%) either had inaccessible files at the registry courts or their ownership records were missing from the files. The missing companies are not significantly different from the rest regarding size (p=0.141) or industry (p=0.366). The missing firms were somewhat smaller on the average than the firms in the analysis.

All changes in ownership are recorded with date, which makes it possible to reconstruct firm careers through ownership states. At each instance when there is a change in any of the top 25 owners (their identity of their shares change), the whole structure of ownership is recorded. These records include the total capital and names and amount of shares held for each of the largest 25 owners. Given the high concentration of ownership in Hungary, the top 25 owners cover 95% of ownership shares on the average.

The owners were categorized into eight types based on the names. The categories for classifying owners were the most refined possible based on the names of owners. In case of ambiguous names Internet searches and typical patterns of ownership was used. Most of these ambiguous names were foreign organizations, where decision needed to classify the owner either as financial or non-financial owner. Altogether there were 4951 owner names. There were only 2% of the names that were not classifiable with this framework, these were

excluded from the further analysis[2]. The eight categories used for classification is presented in table 2.

<div style="text-align:center">

Table 2. about here

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Thus, for each firm we know the variety of the types of owners for each month. Let us consider this mix of owners the *ownership form* of the given firm. The collection of all ownership forms that firms can be in is considered the *ownership state space*. When there is a new ownership form, the switch from one form to the other is an *event*[3]. On the average there were 5,31 ownership forms per firm, that means that on the average firms experienced about four ownership events over the nine year period that I studied.

The ownership state space in the original form is overly complex for any analysis. Considering that each of the top 25 owners can be from one of the eight types there are as many ownership states as firms. To make firm careers comparable and the testing of transition and transformation hypotheses possible the state space needs to be reduced to a manageable size.

THE OWNERSHIP STATE SPACE

A key building block for the operationalization of both transition and transformation hypotheses is the state space of ownership. The complexity of the original state space needs to be reduced in a way that the loss of information is minimal. This should be achieved so that the new state space conforms to the characteristics of large firm ownership in Hungary. On one hand the state space should be detailed enough to enable the testing of various hypotheses – one should be able to classify states in multiple ways (e.g. state vs. private ownership, national vs. foreign ownership etc.). On the other hand the state space should be small enough so that firm careers become comparable.

A marked difference that should be taken into account when creating (collapsing) the state space is that Hungarian large firm ownership is significantly

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[2] Most of the unclassifiable owners were unknown abbreviations and foreign organizations with ambiguous or heavily misspelled names.

[3] The basic nomenclature of sequence analysis is basically the same as the one of Markov chain approaches. While the primary area of interest in Markov chain analyses is typically the properties of the transition matrix, in optimal matching analysis it is the types of sequences.

more concentrated than Western European or United States ownership. In the US and Great Britain firms typically have hundreds of owners, with a 5-10 percent being the median share. In continental European countries ownership concentration is higher, the median of the largest holding is about 50 percent of the shares (Crama, Leruth, Renneboog, and Urbain 2000). In Hungary ownership is even more concentrated: the median of the share of the largest owner is 85%.

This suggests that a reasonable way to decrease the size of the ownership state space is to cut the number of owners to be taken into account. I have used complete link hierarchical cluster analysis to find typical constellations of owners (in terms of mere proportions, leaving aside the type of owner for a moment), using the percentages of the first, second, third, fourth and fifth owners as variables. A three-group solution fitted well to the data (the percentage correctly classified into the three clusters by discriminant analysis is 92,4% compared to the 33,3% random baseline, worst possible fit). The first cluster represents a "dominance" ownership structure, where there is practically only one owner, typically having more than 90% of the shares. This cluster represents 70% of all ownership structures. The second cluster contains a "coalition" ownership structure that is a feature of 25% of all ownership structures. Here there are typically two or three major owners with ownership structures of a comparable size (e.g. 50% and 40% or 40%, 30% and 30%) plus some minor owners (with couple percent shares). The last cluster represents "fragmented" ownership structures similar to the Anglo-Saxon ones with one-digit percentages in the hands of several owners. Only 5% of all ownership structures fall into this cluster. Based on this the conclusion is that the state space should be sensitized to "dominance" and "coalition" ownership structures. It seems to be sufficient to take the top three owners into account in creating a new state space.

The new state space was constructed by classifying all ownership forms by the first largest, second largest and third largest owners. This classification was done qualitatively, by grouping ownership constellations into 16 categories. Table 3 shows these groupings, the elements of the new ownership state space. The first column of this table is the code of each of the states for later reference. The second column contains the label of states, while the third column shows what combinations from the original state space were grouped into the given category. Finally the fourth column shows the frequency of each state category.

Table 3. about here

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The classification was accomplished by the following rules. 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 those types of coalitions that are important to the three hypothesized processes (privatization, recombination and globalization), without creating overly infrequent categories. Such coalition categories in this case are the mixes of state and private ownership (ownership states 3, 4, 5 and 14), coalitions of Hungarian firms and other Hungarian firms (state 7), Hungarian firms and persons (state 8), and Hungarian firms and foreign firms (state 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 (state 10). There are coalitions of foreign firms with other foreign firms (state 12), and foreign firms with others (state 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 (state 14) others (state 15) in the second and third positions. Finally there were some cases that were not classifiable in this scheme.

This state space was used to recode the ownership histories of each firm into a sequence of states ranging from 1 to 16. In the subsequent analysis these firm histories are used to test narratives of change.

TESTING TRANSITION MODELS OF "WHAT HAS HAPPENED"

Transition narratives depict switches between two cross sections as a grand event. In this part of the paper I operationalize and test the three major transition narratives – privatization, recombination and globalization – using the firm level event sequence data outlined above.

Transition narratives are operationalized to retain the key features of their narrative structure in the ideal type: a-temporality (the absence of structured time), unilinearity (one path of changes) and teleology (a-priori known stages of "from" and "to"). A transition narrative is a-temporal in a sense that there are only two relative time points: the "before" and the "after", which are connected by a

grand transition event. Unilinearity means that there is only one such grand event, there are no alternative parallel events. Teleology is reflected in the pre-definition of stages. Stages are derived from a pre-existing grand narrative that not only defines the inevitable future, but also provides the unambiguous starting point.

The ideal type of a transition narrative can be operationalized as an aggregation of firm level events into a grand event. Events are defined here as a firm level transitions from one ownership form to another. These firm level transitions can be aggregated into a table – the transition frequency matrix – that lists the same ownership forms (elements of the state space) on the rows and columns. Its cell entries x_{ij} mean that there had been x number of firms that have ever made the transition from state i to state j. This matrix conforms to the transition view in that it is a-temporal, it collapses time completely into a before-after dichotomy in line with the focus on "what has happened" inherent in transition narratives. Once this matrix is constructed the transition hypotheses are formulated as simplified expected structures of this matrix, aggregations of firm level events into a giant event. For example if the transition from state to private ownership is considered the hypothesis predicts a transition matrix where all the cells that qualify as "from state to private" will contain significantly higher numbers than those cells that does not qualify as such. Table 4. shows the matrix of transition frequencies and one of the hypothesized transition matrices.

Table 4. about here

The test of transition hypotheses are accomplished by QAP (Quadratic Assignment Procedure) correlation analysis. QAP methods are primarily used to test social network hypotheses (Krackhardt 1987; Krackhardt 1988). The transition matrix in this study can be thought of as relational network data – a network of ownership forms connected by transition events, with interdependency between dyads of states that is similar to social network relations. Predicted transition matrices are blockmodels of the transition relation[4]. I argue that QAP analysis fits the nature of the data and the theoretical model of transition narratives the best.

QAP correlation analysis starts with the comparison of two matrices by correlating the corresponding cells. This requires the two matrices be of equal size,

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[4] This procedure was inspired by blockmodel analysis that is used to judge the significance of hypotheses in social network analysis. There the hypothesis matrix indicates the ties between actors that are expected to exist.

and to contain the same actors (nodes) in the same order on the rows and columns in both matrices (to ensure that x_{ij} in both matrices refers to the same tie). The two matrices in social network analysis typically depict two independent relational aspects of the same set of nodes (for example advice relations and friendships for the same set of persons). A high correlation suggests that the two relations are parallel, that is those who go for advice to someone tend to nominate the same person as a friend as well. Since social network relations are interdependent, statistical tests assuming independence are biased. Significance is assessed through a permutation test, that is the rows and columns of the two matrices are independently randomly permuted, and the correlation is recalculated. This procedure is repeated enough (usually several thousand times) to assure that the observed original correlation coefficient is larger in absolute value than at least 95% of the correlations we observe in randomly permuted data.

There are three types of transition hypotheses constructed: the first type is about the change of state ownership into private ownership, the second is about the change of state ownership into network forms of ownership, while the third is about the change of Hungarian ownership into foreign ownership. Within each type there are two subtypes based on how intermediary or mixed forms of ownership are dealt with.

Privatization hypotheses are formulated by grouping state ownership forms into one, and private ownership forms into another, and then postulating a switch between these two groups of forms. The following ownership forms qualify as pure state ownership forms: 2 (State dominant) and 5 (State and other), while the following forms are considered pure private forms: 6 (Hungarian firm), 7 (Hungarian firms), 8 (Hungarian firms and persons), 11 (Foreign non-financial firm), 12 (Foreign firms), 13 (Foreign non-financial firm and others), and 15 (Foreign financial investor and others). The following are mixed forms: 3 (State and Hungarian firm), 4 (State and foreign non-financial firm), 10 (Person as first owner), and 14 (Foreign financial investor and the state). There are two privatization hypotheses: Privatization A and Privatization B. In Privatization A mixed forms are grouped with pure state ownership. This hypothesis represents the narrative that "what has happened is that ownership forms with any state involvement has switched to pure private ownership". Privatization B is a hypothesis where intermediary forms are grouped with pure private ownership, representing a narrative of "what has happened is that full state ownership has switched to at least partial private ownership". Note that it is possible to leave out ownership forms from a transition hypothesis: the "miscellaneous" ownership form is not implied in either the "from" or the "to" end of the grand event.

Recombinant property hypotheses are formulated by grouping state ownership forms into one group and organizational coalition ownership forms into another

group. Here, again there is a mixed group, a group of ownership forms where there is an organizational coalition involving the state. The pure state ownership groups is the same as outlined above. The pure organizational network ownership forms are: 7 (Hungarian firms), 9 (Hungarian firm and foreign non-financial firm), and 12 (Foreign firms). The mixed forms are: 3 (State and Hungarian firms), 4 (State and foreign non-financial firm), and 14 (Foreign financial investor and the state). Here the first hypothesis, Recombination A groups mixed forms with pure state ownership, representing the narrative "what has happened is that ownership coalitions involving the state switched to coalitions of firms as owners without the state being involved". Recombination B is a hypothesis that says "what has happened is that state ownership switched to coalitions that involved other firms as owners".

Finally, hypotheses about globalization are stated by grouping Hungarian ownership forms into one group and foreign ownership forms into another. Pure Hungarian ownership forms are the following: 1 (Local government dominant), 2 (State dominant), 3 (State and Hungarian firms), 5 (State and other), 6 (Hungarian firm), 7 (Hungarian firms), and 8 (Hungarian firm and persons). The pure foreign ownership forms are the following: 11 (Foreign non-financial firm), 12 (Foreign firms), 13 (Foreign non-financial firm and others), and 15 (Foreign financial investor and others). The mixed forms are: 4 (State and foreign non-financial firm), 9 (Hungarian firm and foreign non-financial firm), and 14 (Foreign financial investor and the state). The first hypothesis, Globalization A groups the mixed Hungarian-foreign forms of ownership together with the pure Hungarian forms of ownership, representing the narrative "what has happened is that domestic owners were entirely replaced by foreign owners". The second version of this hypothesis, Globalization B groups the mixed forms with the pure foreign ownership forms, saying that "what has happened is that pure Hungarian ownership switched to ownership forms with foreign involvement".

To test these hypotheses I have computed the R-squared and significance (permutation test p-value) of each of these hypotheses. If a hypothesis suits well to the actual changes of ownership I expect to see a high R-squared and significance for the transition hypotheses outlined above. A small R-squared and lack of significance would suggest that actual events can not be explained with that transition hypothesis. Table 5 presents the results of the QAP correlation analysis.

Table 5. about here

Transition hypotheses overall do not fit well to the actual event data. At the p=0.05 level there is only one transition hypothesis that is significant: the Recombination B hypothesis about the formation of firm coalitions in ownership. The R-squared of all the hypotheses are small. This result is robust for replacing infrequent elements of the transition matrix my zeroes[5]. The ownership events that happened to the largest Hungarian firms of the present day can not be explained within a transition logic, hypotheses about "what has happened". In the next part of this paper I will explore an alternative model that better explain these ownership changes.

TESTING A MULTIPLE PROCESS MODEL OF CHANGE

Transition hypotheses represent insufficient explanations of ownership events. I argue that this is due to the compression of fourteen years of events into one switch, and that these narratives are insufficiently structured to take temporality into account. These models build from only one path of change, and thus represent a suboptimal compromise of model complexity and fit. A narrative model based on multiple yet still a small number of paths is probably closer to an optimal model. In this section I formulate a model with multiple pathways and test these propositions.

How does one operationalize a multiple path model? We can assign an ownership form to each time period of each firm. These assignments constitute the ownership sequence for each firm. The elements of these sequences are the elements of the state space. The time resolution (a clock-tick) in this study is one month, so there is a sequence element for each month for each firm. Until there is no change in ownership, the same element is assigned to each month. At an ownership event the new state is recorded, and repeated until a further ownership event. These sequences can be considered to be the "small narratives" of which I aim at distilling typicality to have an insight into processes. To establish typicality optimal matching analysis and cluster analysis was used.

Optimal matching analysis is a tool to measure sequence resemblance that works 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) have their "costs". The cost of substitutions are usually specified for each dyad of the state space. The most

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[5] Infrequent transitions are defined as those events that only happened to one firm. These events can be considered as outliers.

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.

Optimal matching finds the cheapest way to turn every sequence into every other, thus resulting in an n-by-n matrix where n is the number of sequences - firms in this case (Sankoff and Kruskal 1999). In this matrix x_{ij} denotes the distance between sequence i and j (the total "cost"). This distance (or cost) is zero if the two sequences are identical. The cost is larger the more unique events the two sequences contain relative to one another (creating a higher need for substitutions), or the greater the difference in length between the two sequences (requiring many insertions or deletions to align them). Once the distance matrix between sequences is obtained one can apply cluster analysis to find typical sequences. A cluster of sequences with a small average distance within and a higher average distance to sequences outside the cluster can be used to outline typical sequences. Such clusters will contain firms that share a common way of going along their ownership history.

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 substracting x_{ij} from the maximal symmetrized value. The resulting cost matrix ranged from zero to 19. The indel cost was set to 19. I have used OPTMAT (Abbott and Prellwitz 1997) to accomplish oiptimal 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. A seven cluster classification seemed to be capturing typical sequences best. 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: 0.456, average link: 0.353, and single link: 0.128).

After the cluster analysis I have tested the key aspects of the robustness of this model. The first question is how robust is the optimal matching analysis of this dataset for changes to the indel cost? I have found that changes to the indel cost results in practically no 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).

The next question of robustness is that what the effect of changes to the substitution cost is. I have computed six additional versions of the substitution cost matrix that span a range in terms of cost variance. In the present logic of creating the substitution cost matrix pairs of states i and j are assigned lesser costs if there are frequent transitions between them. You can think of this as a frequency "discount" from the maximal substitution cost. The new range of substitution cost matrices differ in the extent of the frequency discount. In the first the discount is half the original, in the second it is third, and so on to the fifth (with one sixth of the discount). The seventh substitution cost matrix is constant, giving no frequency discount at all. In the first of these matrices the standard deviation of costs is half of the original, in the second it is third of the original, and so on. In the seventh cost-standard deviation is zero. The optimal matching of the sequence data was recomputed with these substitution cost matrices, with an indel cost equal to the maximal substitution cost. I have found that the resulting distance matrices show only little difference in pattern. When the substitution cost with half the standard deviation of the original was used, the correlation between the resulting inter-sequence distance matrix and the original was 0.954. The same correlation for the flat (constant) cost structure was 0.779. Overall there was a strong linear relationship between cost matrix standard deviation and distance matrix correlation (with R squared of a linear fit equal to 0.979).

The description of these seven clusters in terms of typical ownership forms and events is presented in table 6. What are the pathways that we can read from these typical sequences of ownership?

Table 6. about here

The first pathway starts with full state ownership, lasting typically until 1995-97. On the average firms spent 41 months in state ownership (ownership state 2) in this pathway. Then there is a wave of partial privatization for foreigners (a transition to state 4), creating a mix of state and foreign firm ownership. It is only the end of the nineties that a number of these firms become fully foreign owned (state 11). This is one of the two most populated pathways with almost a quarter of the firms. Most of the firms were first partially privatized in the peak years of privatization (1995 and 1997), while some remained in state ownership until 98 (Laki 2000).

The typical story of the second pathway starts with a very short state ownership period – on the average lasting for only six-nine months – then the firm becomes owned by managers or employees or outsiders (with some secondary partners, the state or a Hungarian firm). Most of the events here are in the first years (1990-1993). Here state ownership carries a different meaning than in the case of the first pathway. 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. This is a rather small pathway involving less than a tenth of the firm population.

The third pathway is about becoming owned by one Hungarian firm after being in state ownership. The temporal pattern of this pathway is similar to the first in that there is a longer initial state ownership (here it lasts for about two years on average) followed by Hungarian ownership. The timing of the privatization event is also similar to the first pathway: most of it happens around 1995-97. After entering into the ownership of a Hungarian firm there are no further ownership changes. This is also a smaller pathway with nine percent of the firms.

The fourth pathway is about the breakup of joint ventures and becoming owned by one foreign firm. A typical pathway starts with an ownership coalition of a foreign firm and a Hungarian firm (state 9) that lasts for about two years. This ownership coalition then dissolves into 100% foreign firm ownership (state 11). The dissolution of foreign-Hungarian owner coalitions was a gradual process from 1991 to 1996. This path is the most frequent, the quarter of all firms went down this path.

The fifth pathway is being 100% owned by a local government. The firms here are mostly late starters (1995-96), mostly public utility firms that were transformed into a corporate form, spun off from the organization of local governments. This pathway is an outlier without any ownership event, any other ownership ever than local government.

The typical story in the sixth pathway is that the Hungarian firm and state ownership coalition (state 3) changes into the ownership of multiple Hungarian firms (state 7). These coalitions then dissolve into various ownership forms. The most common of these are single Hungarian firm ownership (state 6), Hungarian firm and foreign firm (state 9) and multiple foreign firms (state 12). This pathway shows the instability of Hungarian firm coalitions (state 7) as owners. This coalition either becomes more centralized with only one Hungarian firm as a

dominant owner. Another way of dissolution is globalization, foreign firms becoming owners. This pathway represents 12% of the firms.

The seventh pathway is another privatization pathway, from pure state ownership (state 2) to state and foreign financial ownership coalition (state 14) and then to coalitions where a foreign financial owner is the dominant (state 15). The appearance of foreign financial owners is typically in 1991-93, while the disappearance of state ownership is 1997-98. There are 15% of the firms in this pathway.

To test the fit of this new multiple path model of change a hypothesis matrix was constructed of the typical events in the seven pathways. This means that the typical events from each of the typical sequences were picked in the original transition matrix. The multiple path transformation model is represented as a predicted event pattern. The same QAP correlation test was used to test the significance and explanatory power of this model. The R-squared was 0,59 with a p value of 0,00. This means that a seven path transformation model explains about 59% of the original event variance. The remaining 41% of the variance are those events that are atypical in the seven pathways. One could account for these events given that one employed a more finely grained classification system of processes. It would be possible to account for all of the variance with a number of processes close to the magnitude of the number of cases. However, that model would have little analytical value, it would be little more than replicating the original complexity of firm histories. I argue that the number of processes taken into account in an optimal model is more than one and less than ten.

CONSTRUCTING A NARRATIVE OF MULTIPLE PROCESSES

In the previous part of this paper I have identified parallel pathways that are promising candidates to represent the ownership transformation of the largest firms in Hungary in a model of change. We have seen that this multiple pathway approach help explain variation in ownership events better than any transition hypothesis. In this part of the paper I switch from explaining event variance to constructing a new narrative. The key tool in our search for a multiple path model of change is sequence analysis. This method was mostly used to *identify* typical sequences, to distil a multitude of events into few typical sequences. But sequence analysis itself has not the tools to return to the big picture of historical change, to explore the context and the possible coherence of typical sequences. Since sequence analysis was used so far mostly to typify human careers, where the primary question concerns the typical sequences and not a narrative of a process with multiple paths. In this paper the typical sequences are thought of as

pathways, and we must address the relations of these pathways to be able to construct a coherent narrative. In other words now I turn to the whole firm population as our unit of analysis. What were the major restructurings along the seven pathways? Were there turning points where pathways started to diverge or converge? Does transformation slow down or speed up at the end of the nineties? Is there a point when major changes cease and give way to "normal" ownership changes that we would expect to see in a consolidated capitalist economy?

DYNAMIC SCALING ANALYSIS OF PATHWAYS

To observe how pathways converged or diverged I apply a moving window approach. The proximity of the seven pathways is measured over a two year period that moves year by year as a moving temporal window. Two pathways are proximate in a two-year window if many firms in them are in the same ownership state. 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 were mostly in the same ownership states over a two year window. To represent the varying proximities of pathways to one another multidimensional scaling was used. This approach is referred to as dynamic scaling (Cox and Cox 2000), the general idea is to use special representations to depict pattern shifts in time series or panel data by time (Raveh 1981; van der Hejiden and de Leeuw 1989). There are altogether eight time points where we measure the proximity of pathways. These eight correlation matrices are then represented by multidimensional scaling with one dimension. This means that for each of the eight time periods the seven pathways are represented along one coordinate, with proximate pathways closer together. 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[6]. This is shown on figure 1.

Figure 1. about here

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[6] 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.

What is the narrative we can tell with seven winding paths? What should we look for? First of all we should be careful in reading figure 1. The horizontal axis represents time with the two year moving windows. The vertical axis does not represent a predefined coordinate (such as the number of events or firms in pathways), the metric is the proximity of pathway ownership compositions. A pathway "jumps" to another position along this dimension if it becomes similar to other pathways and dissimilar to those that it was close to. The meaning of this axis changes (potentially) at each time point. One of the key tasks for constructing a coherent narrative is to decode the changes in the meaning of this axis and to delimit periods in the whole transformation epoch – this will serve as raw material for a new narration of change.

The first task in incorporating the results of the dynamic scaling approach into a narrative of ownership restructuring is to understand the overall temporal structure of the interplay of processes. The first question is whether there are clear cut phases and identifiable conjuntures. The entire epoch seems to consist of three phases. In the first and the third there are only moderate changes to the directions of pathways and the clusters of proximate pathways are stable. In the middle phase there are major restructurings, drastic shifts to the directions of most pathways. So let us progress along these three phases to decode the meaning in the directionality of pathways.

In the first phase, 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 that many firms in these pathways are in state (or local government) ownership, representing 62% of the firms in our population. The two outliers (pathway 4 and 6) are two alternative paths to state ownership. Pathway 4 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 phase is about turbulence and restructuring. In the window of 1993-94 we see two jumps: pathway 6 jumps close to pathway 4 and pathway 7 becomes the other end of the palette of pathways. What happens here is that many firms in pathway 7 exit from state ownership and become partially owned by foreign financial investors. This pushes the two organizational coalitions (pathway 4 and 6) close together as one alternative to state ownership, while on the other end we see foreign institutional investors as another alternative. (It is the nature of the scaling method that a pathway can change its position even if nothing has happened to it if other pathways change.) In the 1994-95 window there are only minor changes. Pathway 6 continues to move up to become a marked pathway at the positive extreme of the coordinate. In this period many of

the state-Hungarian firm coalitions in this pathway change into the coalition of multiple Hungarian firms. In the next window of 1995-96 pathway 4 jumps down and approximates pathway one. In these years more and more joint ventures dissolve in pathway 4, the Hungarian firm-foreign firm coalition becomes single foreign firm ownership. In pathway one there are more and more firms privatized for foreign firms, some ends up with the same ownership (one dominant foreign firm as owner).

The third major phase starts with the 1996-97 window. Here we see two major clusters of ownership emerge: Hungarian ownership at the top and foreign ownership at the bottom. There are a number of firms in pathway 7 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 are more or less stay parallel. At the end there are three pathways (the first, the fourth and the seventh) that represents majority foreign ownership, this is 65% of the firms in our population.

NARRATIVE CONSTRUCTION

How did the population of the now largest firms in Hungary transformed from two thirds of state ownership at the beginning of the nineties into two thirds of foreign ownership, typically ownership of a single foreign non-financial firm? The aim of this part of the paper is to provide a narrative explanation for this. As the raw material of this narrative I will use the timeline of winding pathways as described in the previous chapter.

The typical form of ownership in the first years of the nineties was full state ownership. Beyond this there is a distinct private alternative: ownership by a coalition of other firms. There are two major types to this form: Hungarian firms as owners, and joint ventures, Hungarian and foreign firms as owners. To find this form of ownership as the early alternative to state ownership is consistent with the findings of David Stark (1996) and Gil Eyal, Ivan Szelenyi and Elanor Townsley (1998).

David Stark found - based on ownership data from 1994 - that the dominant for of private ownership is being owned by other firms. This, what he termed as recombinant property represents a network, a safety net of ownership in the most turbulent times of institutional change. Eyal et al. point out – based on survey data from 1993 - that private property is organized into diffuse property relations (network of ownership between firms) rather than being in the hands of managers

or capitalists. They argue that this arrangement provides more room for managers to maneuver and shield them from uncertainties. The arguments of Stark and Eyal et al. provide an explanation to the firm-coalition alternative as an effect of uncertainties.

The two variants of this coalition form – Hungarian firms and Hungarian-foreign coalitions – represent two variants of an ownership portfolio in a reversed sense (a portfolio that contains owners) that channels benefits, information, and often a steady demand for products or a supply of inputs (Stark et al. 1999). The foreign-Hungarian portfolio seems to had been a better diversified portfolio with potential access to more resources (especially capital). It requires a significant amount of trust to invest in a foreign country, especially in uncertain and turbulent times. For the foreign investors this trust is established by network ties, the assurance of having a Hungarian firm as a co-owner. Despite differences in diversification, both portfolios served the same purpose: to shield the owned firm from extreme institutional uncertainties trough a network of other enterprises.

1994 brings about a turning point in the ownership of some state owned firms: they get partially privatized by foreign financial investors. In these arrangements foreign financial investors a given guarantees for profit through the certainty that the majority state owner will bail out the firms they own. 1994 was the year of the first boom on the Budapest Stock Exchange, the index jumped from 1000 to above 2000 (REFERENCE). While the direct role of the stock exchange in ownership was, and is still miniscule (there are only 46 companies on the stock exchange, and only 16 from the top 200 population), the index boom indicates heightened interest of investors, mostly foreign investors, to buy shares. Even though these investors (as manifested in the seventh pathway) are secured by a majority state ownership, their appearance signifies the end of extreme uncertainties.

1995 is the first major year of privatization. This leads to a major conjuncture in 1995-96 in the history of large firm ownership. There are three developments that reorganize ownership pathways: a wave of privatization for a single foreign firm, privatization for a single Hungarian firm, and the breakup of foreign firm-Hungarian firm ownership coalitions. The first potential cause for this conjuncture is that ownership by a single firm (be it Hungarian or foreign) is made a viable ownership form by the decrease of uncertainties. Probably there are two causes here: one is that the need for safety nets is eliminated by relative stability in the environment, and the other is that more concentrated ownership presents better opportunities to profit and less coordination cost with owners. With high uncertainties the coordination costs of ownership coalitions are outweighed by the benefits from distributed uncertainty through a network of ownership. The single corporate owner pattern is a direct product of the tender privatization strategy of

the state, enforced by the centralized State Privatization Agency (SPA) after the tumultuous 'spontaneous privatization' period of the early nineties. Privatization tenders targeted foreign strategic investors. The SPA bureaucrat's preference was to have as few negotiation partners as possible for a privatization deal to minimize their coordination costs.

Foreign firm-Hungarian firm coalitions started to dissolve before the privatization wave, suggesting that it was not the appearance of solo foreign firm owners buying state property that made coalition partner foreign firms to want to catch up to realize the benefits of being a single owner. A more likely explanation is that it was a product of the decrease in macro uncertainties and the product of the internal logic of firm careers. As firms grow the need arises to raise capital. It was the foreign firms who were able to supply more capital thus their ownership share was increasing. These two causes interact – the lesser the uncertainties, the brighter the future of the firms – thus the need for a Hungarian firm as a partner owner lessened: their social capital to buffer uncertainties lost its value, and they were less able to supply money for capital raise.

The coalition of two or more Hungarian firms as owners did not dissolve, that suggests that there were causes that outweighed diminishing need to utilize uncertainty shielding network ties. Since these 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 were able to buy the other's shares. In some occasions we see these coalitions to transform into a Hungarian firm-foreign firm coalition, that suggests it is the lack of capital that prevents the dissolution of the pure Hungarian firm coalition.

The narrative that we can construct out of these winding pathways lacks teleology in that unrealized or broken lines of the story can also be identified. The most important of these is the organizational coalition ownership form that seemed to be the early alternative for state ownership. Stopping with following the story in 1995 would have suggested that organizational coalitions represent the property form furthest away from state ownership. At this point in the processes was when David Stark has observed the prevalence of recombinant inter-organizational network property forms. That line of the story was lost in the reshuffling of the ownership pathways into a foreign-Hungarian ownership dichotomy. It is only ex-post that we recognize the phase between 1994 and 1997 as a period of turbulence: it is only the stability between 1997 and 1999 that this middle phase is recognizable.

However, we should not dismiss any accounts about the importance of (inter-) organizational coalition ownership and any other form that disappeared by the end

of the epoch. This would mean reducing our story into a transition narrative about the switch from two thirds state ownership at the beginning of the nineties into two thirds foreign firm ownership at the end of the nineties. Instead the finding that organizational coalition ownership forms (pathway 4 and 6) did play a distinctive role in the first half of the nineties should prompt further research projects to explain the conditions and consequences (see the outline of the analytical strategy of an ongoing research project of Stark and Vedres (Stark and Vedres 2001)). The focus on dissolving coalitions of Hungarian firms as owners can help realizing that this was the direction (entry strategy) foreign owners have followed. In pathways one, four and seven foreigners entered as owners on the side of other Hungarian owners: the state or Hungarian firms. Later in each of these pathways foreigners moved towards dominance.

CONCLUSIONS

The temporal structure of a model of social change is not only a theoretical question, but a crucial question of analytic strategy. Opening up the temporal dimension can lead to better explanations. It is ironical that while postsocialism is often declared to be a living laboratory of social change the models applied to these changes are a-temporal and foreign to historical explanations. Presentism in any form does not explain the fourteen years of changes. A historical approach that builds from the meso-level concept of pathways, and the conjunctures of these pathways explains and captures the changes that are unexplained by trying to answer "what has happened".

Formulating a model with temporality at its core not only provides for better fit and explanatory power, but helps reinterpreting the theoretical problem of social change. Transition as derived from a grand narrative can be replaced by the concept of emergent transition, a transition that emerges from the conjuncture of pathways of change.

Sequence analysis is a promising tool for modeling social change, though it is not instantly suited by design for such a task. Sequence analysis itself lacks the tools to return to the population as a whole and measure temporality of overall change. It's worthy of mentioning that the key proponent of sequence analysis, Andrew Abbott has both written on sequences (Kennedy 2001) and turning points in social change (Abbott 1997), but has never connected these two lines of work. One crucial limitation of sequence analysis when used to depict social change lies in the image of typical sequences as isolated tracks. Hopefully this can be overcome by some methodology that visualizes the branching and directionality of sequences.

TABLES

Table 1. The meaning of ownership forms in sequence context

First ownership form	Second ownership form	The meaning of 'Hungarian firm and foreign firm' ownership form
State	**Hungarian firm and foreign firm**	Private ownership
Hungarian firm and foreign firm	Foreign firm	Partial foreign ownership
Hungarian firm and Hungarian firm	**Hung firm and foreign firm**	Coalition ownership of organizations

Table 2. The possible 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
Hc	Hungarian company	1336
Hp	Hungarian persons	1429
Fn	Foreign non-financial company	687
Ff	Foreign bank or financial company	263
Fp	Foreign person	37
	Total:	5060

Table 3. The space of ownership forms.

Code	Label of ownership form	Owners (first–second–third)	N
1	Local government dominant	Lg–00–00	19
2	State dominant	St–00–00	115
3	State and Hungarian firms	St–Hc–xx, Hc–St–xx, Hc–Hc–St	34
4	State and foreign non-financial firm	St–Fn–xx, Fn–St–xx, Fn–Os–xx	51
5	State and other	St–xx–xx, Os–xx–xx	33
6	Hungarian firm	Hc–00–00	61
7	Hungarian firms	Hc–Hc–Hc, Hc–Hc–xx	62
8	Hungarian firm and persons	Hc–Hp–xx, Hp–Hc–xx	44
9	Hungarian firm and foreign non-financial firm	Hc–Fn–xx, Fn–Hc–xx	87
10	Persons as first owner	Hp–Hc–xx, Hp–St–xx, Hp–Hp–xx, Hp–xx–xx	66
11	Foreign non-financial firm	Fn–00–00	225
12	Foreign firms	Fn–Fn–Fn, Fn–Fn–xx, Fn–Ff–xx	68
13	Foreign non-financial firm and others	Fn–xx–xx	23
14	Foreign financial investor and the state	Ff–St–xx	40
15	Foreign financial investor and others	Ff–xx–xx	36
16	Miscellaneous	Miscellaneous	18
	Total:		982

Table 4. The original transition matrix (4.a.) and the hypothesized transition matrix based on the privatization hypothesis A (4.b.) The indices of the rows and columns represent ownership forms from table 3.

4.a. Transition matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	-														1	
2		-	2	12	10	7	3	4	4	6	3	4	4	5	2	4
3	1	-	2			2	4		3							
4		1		-	1			1	4		3	3	1	2	1	
5		3	2	1	-	3		2		3	1				1	
6		2				-	1	1	4		3				1	
7	1		2			2	-	3	3	1						
8						2	4	-	1	6						
9				3		2	1	1	-		16	5	2		1	1
10					2			5	1	-	1	2	1		1	
11						5			3		-	7				2
12			1		1		1		2		8	-			1	1
13									2		2	1	-		1	
14								1				1		-	6	1
15	1						3			1	2	2		3	-	1
16			1			2						1		1		-

4.b. Hypothesized transition matrix – privatization transition A

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	-															
2		-				1	1	1	1		1	1	1		1	
3			-			1	1	1	1		1	1	1		1	
4				-		1	1	1	1		1	1	1		1	
5					-	1	1	1	1		1	1	1		1	
6						-										
7							-									
8								-								
9									-							
10						1	1	1	1	-	1	1	1		1	
11											-					
12												-				
13													-			
14						1	1	1	1		1	1	1	-	1	
15															-	
16																-

Table 5. The proportions of the variances explained by the transition hypotheses. Cells contain R squared, and significance (proportion of correlations with a higher absolute value from random permutations) in parentheses.

	QAP R squared with 10.000 random permutations	
Independent variable (transition hypotheses)	Dependent variable	
	Original transition matrix	Transition matrix if $x_{ij}>1$
Privatization A	0,94% (0,225)	0,74% (0,270)
Privatization B	7,18% (0,084)	7,34% (0,092)
Recombination A	1.41% (0.088)	1.79% (0.067)
Recombination B	5.85% (0.037)	6.20% (0.034)
Globalization A	0,71% (0,157)	0,37% (0,242)
Globalization B	0,00% (0,497)	0,00% (0,498)

Table 6. Pathways of ownership change

Pathway	N	%	Typical sequences
1. Late gradual privatization for a foreign firm	45	24.3%	2-4, 2-5, 2-4-11, 2-4-9, 2-12
2. Early privatization for persons	16	8.6%	2-10, 10, 8-10
3. Privatization for a Hungarian firm	17	9.2%	6, 2-6
4. Dissolving joint ventures, foreign firm	48	25.9%	11, 9-11, 11-12
5. Local government company	8	4.3%	1
6. Reshuffling Hungarian firm coalitions	23	12.4%	7, 7-9, 3-7
7. Gradual privatization for foreign financial investors	28	15.1%	2-14-15, 14-15
Total:	185	100.0%	

Figure 1. Timeline of relative pathway proximity.

1 - Late gradual privatization for a foreign firm

2 - Early privatization for persons

3 - Privatization for a Hungarian firm

4 - Dissolving joint ventures, foreign firm

6 - Hungarian firm coalition

7 - Gradual privatization for foreign financial investors

31
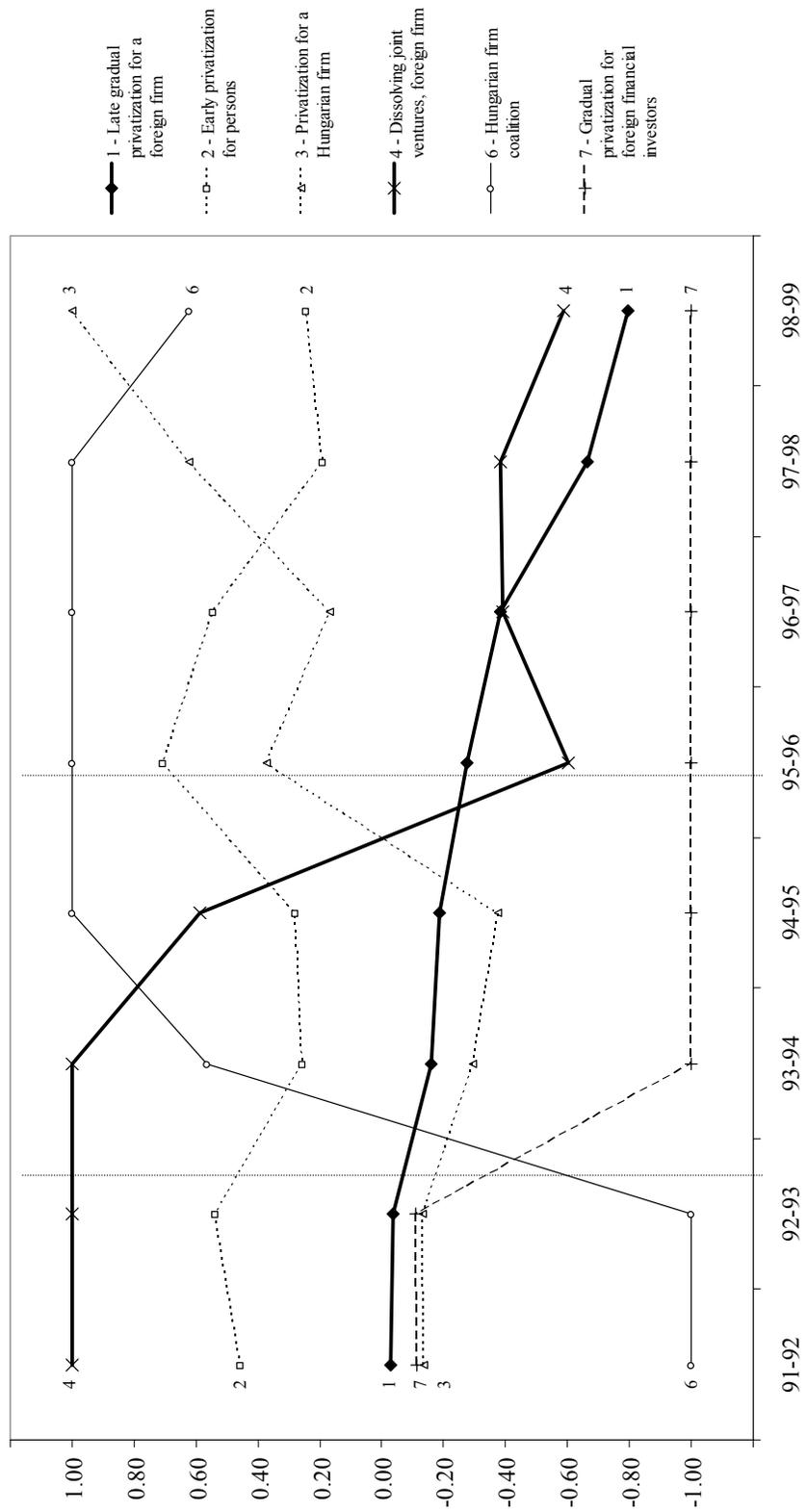
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