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## Inter-generational micro-class mobility during and after socialism: The power, education, autonomy, capital, and horizontal (PEACH) model in Hungary

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### Abstract

We propose a theoretical model of how occupational mobility operates differently under socialism than under market regimes. Our model specifies four vertical dimensions of occupational resources—power, education, autonomy, and capital—plus a horizontal dimension consisting of linkages among occupations in the same economic branch. Given the nature of state socialist political-economic institutions, we expect power to exhibit much stronger effects in the socialist mobility regime, while autonomy and capital should play greater stratifying roles after the market transition. Education should have stable effects, and horizontal linkages should diminish in strength with market reforms. We estimate our model's parameters using data from surveys conducted in Hungary during and after the socialist period. We adopt a micro-class approach, though we test it against approaches that use more aggregated class categories. Our model provides a superior fit to other mobility models, and our results confirm our hypotheses about the distinctive features of the state socialist mobility regime. Mobility researchers often look for common patterns characterizing mobility in all industrialized societies. Our findings suggest that national institutions can produce fundamentally distinct patterns of mobility.

### Keywords

Micro-class; Hungary; Intergenerational; Occupational mobility; Market transition; State socialism

## 1. Introduction

The collapse of state socialist societies and their rapid movement toward market-based economic systems was the most dramatic example of macro-level institutional change in the second half of the 20th Century. Inspired by the possibility that market transition could reveal the processes through which economic and social institutions shape social inequality, sociologists have explored the impact of sweeping market reforms on different aspects of

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social stratification (see Keister and Borelli, 2012 for a recent review). Many studies address intra-generational processes of inequality, such as the relative effects of political, human, and social capital, gender, and structural change on earnings, employment, and other labor market outcomes (Bian and Logan, 1996; Domanski, 2005; Gerber and Mayorova, 2010; Gerber, 2012, 2006, 2002, 2000a; Nee and Oppen, 2010; Nee, 1996, 1991, 1989; Róna-Tas, 1994; Trapido, 2007; Verhoeven et al., 2005; Walder, 2003, 2002; Wu and Xie, 2003; Wu, 2006; Xie and Hannum, 1996; Zhao and Zhou, 2002; Zhou et al., 1997).

Here we push the market transition literature in a relatively new direction by focusing on how the institutional retreat from state socialism re-shaped the mechanisms governing inter-generational occupational mobility. Although some work has examined post-socialist changes in inter-generational stratification processes such as the effects of social origins on education and status attainment (Bukodi and Goldthorpe, 2009; Gerber and Hout, 2004; Gerber, 2007; Luijkx et al., 2002; Saar, 2009; Simonova, 2003; Walder and Hu, 2009; Wu, 2010), this literature is less developed than analyses of intra-generational processes.

The potential effects of the institutional changes associated with market transition on inter-generational occupational stratification are less intuitively obvious than their effects on earnings and labor market outcomes. This is because it takes some time to observe changes in the origin-based patterns of investment in education that form the principle mechanisms of inter-generational inequalities in contemporary societies. Moreover, these studies generally share a limited theoretical agenda emphasizing whether and how market transition affects the magnitude of origin-based inequalities in educational and occupational attainments. For example, the rise of market institutions and retreat of state-based commitments to provide equal opportunity increased the strength of origin effects on educational and occupational destinations (Bukodi and Goldthorpe, 2009; Gerber and Hout, 2004). The present study breaks new ground by considering whether the collapse of state socialism leads to changes in the mechanisms shaping how parents' occupations influence those of their children.

This requires a theoretical model of how inter-generational occupational mobility operated differently under socialism than under market regimes. Here the existing literature offers little guidance. Numerous comparative mobility analyses have analyzed current and former state socialist countries (e.g., Breen, 2004; Erikson and Goldthorpe, 1992; Grusky and Hauser, 1984) and others have analyzed individual socialist countries (Bukodi and Goldthorpe, 2009; Ganzeboom et al., 1990; Gerber and Hout, 2004; Kolosi, 1988; Róbert and Bukodi, 2004a; Wong and Hauser, 1992). However, these studies examine whether state socialist societies depart from capitalist societies in their magnitude of occupational mobility rather than explicitly modeling one or more distinctive dimensions of mobility that directly reflect the unique institutional features of state socialist society. A more theoretically satisfying answer to the question of whether state socialist societies exhibited particular mobility patterns should propose at least one mechanism or dimension of mobility that is particular to state socialist institutions. Wu and Treiman (2007) stands out as an important attempt to conceptualize and measure a distinctive mobility regime in a state socialist society. However, their model of how China's hukou system created starkly different

mobility patterns in urban and rural areas is not applicable to any other state socialist societies, because only China has had a hukou system.

We propose a model of occupational mobility based on four theoretically derived vertical dimensions of occupational resources—power, education, autonomy, and capital—plus a single horizontal dimension consisting of linkages among occupations in the same industry or branch of the economy. Our mobility model explicitly incorporates the political power associated with different occupations, an especially salient vertical dimension of inter-generational occupational linkages unique to state socialist societies due to the overwhelming political and economic control of their Communist Parties. We hypothesize that the power dimension is a signature feature of socialist-era mobility regimes that should, in principle, diminish or even disappear with the passing of state socialism and the consolidation of market institutions. We also expect the effects of education to remain roughly similar, the importance of autonomy and capital in inter-generational occupational inheritance to increase, and the role of horizontal linkages to decline as a result of market transition.

We estimate our model's parameters, which directly correspond to the five dimensions covered by our hypotheses regarding common and distinctive features of state socialist and market-based mobility regimes, using data from surveys conducted in Hungary during three periods: late state socialism (pre-transition), the era of transition to a market-based economy, and the post-transition period of 'market consolidation,' when market institutions had been clearly reestablished. By analyzing a single country under state socialist and post-socialist conditions, we can explicitly test the effects of reigning political economic institutions (state socialism vs. markets), because potential confounding factors such as national culture or prior historical pathways are controlled by the focus on a single country.

To better capture independent variation among occupations along all five of our theoretically central dimensions, we analyze 'micro-class' mobility (Jonsson et al., 2009). Our model fits the data well and performs better than other conventional mobility models, including other theoretically-derived models and models that empirically scale occupations.

Comparisons of the magnitude and significance of specific parameters across the three periods covered by our data mainly support our hypotheses. State socialist mobility regimes exhibited distinctive characteristics from market-based mobility regimes that are inadequately characterized by statements regarding the overall level of mobility or the degree of divergence from the model of 'core social fluidity' (Erikson and Goldthorpe, 1992). Under socialism—but not during or after market transition—political power was a separate dimension of occupations that shaped how people's occupations depended on those of their parents. Education is an equally important component of occupational inheritance under both systems. The autonomy and capital associated with occupations play a greater stratifying role under market systems than under state socialism, while horizontal linkages among groups of occupations play a lesser, though still statistically significant role, in market systems than under state socialism. Additional analyses show only minimal variations in mobility parameters by gender and confirm that the changes in parameter values represent period effects rather than cohort replacement.

Our paper provides at least three important and new contributions to the literature. First, we shift the theoretical focus from the question of how changes in economic and political institutions influence the *strength* of inter-generational associations between occupational origins and destinations to the hitherto unexplored problem of how they influence the mechanisms that produce these associations. Second, we introduce a new inter-generational mobility model, the PEACH model, which allows us to assess empirically our theoretical ideas regarding institutional change and mechanisms of occupational inheritance and mobility. Third, our PEACH model contributes to the new and growing literature that uses disaggregated mobility tables a model that represents both mobility and immobility processes and does so in a more parsimonious, theoretically informed fashion than previous applications of this approach.

The paper is structured as follows: after introducing the theoretical dimension of the PEACH model (Section 2) we present our hypotheses regarding how the institutional change during market transition in Hungary influenced mobility mechanisms (Section 3). The data and measurements (Section 4) and description of our empirical model (Section 5) are followed by the comparison of the PEACH model with other commonly applied mobility models and the tests of our hypotheses (Section 6). The paper ends with a discussion of results (Section 7).

## 2. A new mobility model: power, education, autonomy, capital, and horizontal linkages (PEACH)

Occupational mobility researchers have proposed a range of models for the study of how occupational origins and destinations are related. Two broad types of models have their adherents (see Hout, 1983): association models, which empirically scale origin and destination occupational categories and represent the association between these categories using a single parameter (Goodman and Magdison, 1978), and topological models, which theoretically specify regions in the mobility table with distinctively high and low cell frequencies, denoting either excess mobility or immobility (Erikson and Goldthorpe, 1992; Hauser, 1978). Association models often provide a better fit to the data, because they optimize the scaling of occupational categories empirically. But for the same reason they are less satisfying from a theoretical perspective because they offer limited scope for testing hypotheses about the mechanisms that lead to class reproduction across generations. Hybrid approaches combining elements of both these strategies have proven popular (see Hout and Hauser, 1992; Wong, 1992).

Building on more general efforts to capture inequalities on the occupational level (Grusky and Weeden, 2001; Weeden and Grusky, 2012; Weeden, 2002), Jonsson et al. (2009) present a new model for the analyses of ‘micro-class’ mobility, combining elements from both association and topological approaches. They model intergenerational reproduction within micro-classes using a unique effect for each diagonal cell in detailed  $82 \times 82$  occupational mobility tables. Their model also allows excess mobility between micro-classes that fall in the same larger (‘big’ or ‘meso’) class and scales occupations along a single socioeconomic status dimension to capture vertical mobility between micro-classes. Jonsson et al. (2009)

show that there are occupation-specific rigidities in social reproduction that large-class analyses do not capture. Because they focus on immobility and the extent to which apparent 'meso-class' immobility reflects micro-class mobility, their specification of vertical mobility between micro-classes is underdeveloped. Moreover, because it uses a large number of parameters to represent diagonal association, Jonsson et al.'s model does not provide a parsimonious and intuitive way to decipher what aspects of occupations induce variation in rates of immobility within them and of mobility to and from other types of occupations.

Jonsson et al. suggest that their model, the only one to date we have seen applied to disaggregated mobility tables, can be extended by scaling occupations according to the kinds of skills, cultural capital, or social networks that are distinctively associated with them, with the expectation that mobility is greater between occupations with more similar values on these scales (Jonsson et al., 2009, p. 991). We take up that suggestion by proposing a new model for micro-class mobility in socialist and post-socialist Hungary, which derives from and expands upon Hout's (1984) 'status, autonomy, and training' (SAT) model. The SAT model conceives of occupational mobility (and immobility) in terms of movement (and persistence) across the three vertical dimensions in its title. We supplement and modify these dimensions to generate the 'power, education, autonomy, capital, and horizontal' (PEACH) model. Thus, in contrast to the Jonsson et al. model and association models we theoretically specify multiple dimensions of occupations across which parents' occupations influence those of their offspring.

We now present each of these dimensions in turn. Then we develop hypotheses as to how their relative importance changes due to the institutional transformations associated with the collapse of state socialism.

## 2.1. Power

The Communist Party (CP) is a central institutional source of social stratification in state socialist societies (Gerber, 2000b). In market societies, the distribution of economic resources is driven largely (though not entirely) by market forces and privately-held resources; political power is less influential on life chances (Parkin, 1971). In state socialist societies the CP monopolizes both political and economic power. It controls the allocation of the means of production between different production sites (Kornai, 1992), as well as elite jobs (Li and Walder, 2001; Walder, 1995), social rewards, housing, and other privileges (Matthews, 1978; Szelényi, 1983). In systems where the party and the state are intertwined, certain economic and social privileges are mainly accessible through political connections; therefore, political power in the form of political information and network capital is a pervasive determinant of life chances (Gerber, 2000b). In light of the significant rewards that, on average, accrue to CP members, it is not surprising that parental CP membership has been a significant predictor of educational attainment, net of other measures of parental background, in state socialist societies (Gerber, 2007, 2000a; Matěj , 1993; Szelényi et al., 1998; Walder and Hu, 2009; Wong, 1998; Zhou et al., 1997).

Communist parties recruited members disproportionately from certain occupations. Although their official ideological commitments led them to maintain a presence among the industrial proletariat, CPs also sought to bring various governmental, managerial,

professional, military, and technical elites into their fold, as a means of maintaining control (Djilas, 1957; Harasymiw, 1984). Party membership ensures political reliability, and thus, in the context of state socialism, it became a paramount criterion for advancement in careers involving ideological work, leadership, responsibility, or potential influence. In state socialist Hungary even rank-and-file CP members often provided information to party officials in the form of ‘morale reports’ (a translation of the Hungarian expression *hangulatjelentés*, meaning reports on the political morale of workers) or they investigated the political reliability of colleagues.

For these reasons, CP membership is rightly viewed as a measure of power (or ‘political capital’ [Verhoeven et al., 2008]) in state socialist societies. Applying this notion to occupations, we propose that the level of an occupation’s party saturation (the percentage of incumbents who are party members) is an independent vertical dimension of occupational transmission from parent to child in state socialist societies. Incumbents in occupations with high levels of party saturation enjoy higher levels of political, economic, and social power relative to those in occupations with low levels of party membership, *whether or not they are members of the party themselves*. Of course, those who are in the CP most likely enjoyed even greater social power than those who were not. But irrespective of individual-level CP membership, the more the CP saturates a given occupation, the more we can infer that the occupation is politically, economically, and socially important, and the more likely that political considerations shape its hiring, promotion, and evaluation criteria, how professional ties are formed, through which channels information is gathered, and which strategies are applied to get ahead. Even non-party members in that occupation would have to become adept at complying with party norms and practices and would likely exploit the strategic importance of their occupation to secure benefits and resources from the party. Thus, political power is a tangible and measurable occupation-based resource to a much greater degree in state socialism than it is in market societies. In effect, the level of party saturation of an occupation testifies to its political standing in the eyes of the party. Incumbents in party-saturated occupations likely have both the incentive and the means to encourage their children to enter party-saturated occupations. They could do so by socializing them into the ideological norms and practices of the CP, using network connections to enhance the opportunities for recruitment by the CP, and emphasizing the less obvious advantages (within the reigning institutional structure) of CP membership.

An apparent ‘power’ effect on mobility rates could be an artifact of the positive association of party membership with income and educational attainments. We hypothesize, however, that even controlling for the education and income associated with occupations (as we do in our model), the power associated with occupations exerts an independent effect on inter-generational mobility due to the over-arching authority of the CP in state socialism. In contrast, we doubt that power represents an independent source of occupational transmission in market societies because they lack the institutional equivalent of a monolithic, omnipresent, and all-powerful Communist Party.<sup>1</sup>

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<sup>1</sup>Note that our notion of power as a dimension of occupations that should matter for mobility under state socialism is distinct from the concept of supervisory “authority” that class theorists have cited as an alternative basis for class position (Dahrendorf, 1959; Wright,

## 2.2. Education

The role of education in intergenerational inequality is well known from the literature on social reproduction (Bernstein, 1975; Bourdieu and Passeron, 1990 [1970]; Collins, 1979; DiMaggio and Mohr, 1985; DiMaggio, 1982). Educational credentials and training are associated with occupational specialization, and through childhood socialization parents who are professionals influence their sons and daughters so as to encourage them to pursue professional occupations themselves (Kohn, 1969). Families transmit education-based cultural and network resources to their children, but also norms of the ‘occupational subcultures’ parents belong to (Collins, 1975; Weeden and Grusky, 2012), which influence the educational careers of their offspring and direct them towards occupations which require educational credentials. Our ‘education’ dimension is similar to Hout’s (1984) ‘training,’ but it is broader because it captures the different ways that education can serve as a resource (which include, but are not limited to, specialized training).

The salience of occupational education as a dimension of inter-generational mobility presumes that class origins affect educational attainment, which may have been less characteristic of socialist systems, given their stated commitment to egalitarian principles. For example, Hungary’s socialist regime implemented quotas to promote the access of individuals from the working class and farm backgrounds to education (Simkus and Andorka, 1982). At the same time, the state socialism aimed to establish an educational meritocracy in occupational allocations (Luijkx et al., 2002). Empirical research shows that neither aim was accomplished. An initial decline in origin-based educational inequalities gave way to their restoration by the 1980s (Bukodi and Goldthorpe, 2009; Hanley and McKeever, 1997). Comparisons between Hungary and market economies show that the general patterns with which occupational class origin determines education and conversely, education determines occupational class destination are basically the same (Ishida et al., 1995). Thus, we do not expect that education played a particularly weak role in occupational transmission during Hungary’s socialist period.

## 2.3. Autonomy

The degree of autonomy associated with a parent’s occupation tends to positively predict average autonomy of a child’s occupation (Hout and Rosen, 2000; Hout, 1984; Hundley, 2006; Sørensen, 2007). Autonomy, usually equated with self-employment, is transmitted between generations through mechanisms of role modeling, internalization of dispositions characteristic of entrepreneurship (i.e. self-sufficiency, independence, risk-taking, aversion to authority) during socialization, property inheritance, and in early career involvement in small-business operations.

The transmission of occupational autonomy presumes that political institutions maintain legal and economic conditions that foster a fairly large contingent of occupations with high average autonomy. In state socialist economies, however, self-employment and private property ownership is restricted or even criminalized. In socialist Hungary, arguably the

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1985). We are using “power” in a much broader sense that is closer to the usage of “power elite” theorists (Domhoff, 1998; Mills, 1956): generalized, society-wide power (as opposed to power concentrated in the workplace).

most liberal of state socialist economies from the late 1960s onward, less than 3% of the labor force was self-employed (Róbert and Bukodi, 2004b). In the 1980s entrepreneurial activity in the ‘second economy’ (Gábor, 1989) began to grow in the form of non-registered side jobs, occasional part time work, or ‘second informal shifts’ at the workplace where one had a full-time job. The second economy developed first in the agricultural sector (Szelényi, 1988): the large majority of family farms, roughly 1.7 million, engaged in ‘secondary’ agricultural production ranging in size from self-sufficient farms to farms with large-scale marketing (Galasi and Gábor, 1981). The emergence of the second economy could influence mobility during the state socialist period, but the very low level of self-employment overall and hierarchically organized authority structure of state-owned enterprises and organizations meant that few occupations could be associated with high levels of autonomy. Therefore, we do not expect that autonomy shaped occupational inheritance and mobility patterns under state socialism.

#### 2.4. Capital

The capital (economic resources) associated with different occupations, which we operationalize as occupational income, shapes inter-generational occupational transmission in a straightforward and intuitive fashion: parents in high-earning occupations have both the resources and the incentive to ensure that their children also end up in high-earning occupations. Parental income can be deployed to secure educational advantages for children (more prestigious schools, extracurricular tutoring, freedom from having to combine work with study), which in turn lead to more lucrative careers. Income can also influence occupational reproduction through preferences for consumption patterns and lifestyle acquired in the family environment (Bourdieu, 1984). Children from high consuming and affluent families prefer jobs that allow them to reproduce the lifestyle of their families.

We expect the influence of capital to be weak, if not absent, in most state socialist countries, including socialist-era Hungary. The most important reason is that income differentials between occupations are low compared to market economies (Atkinson and Micklewright, 1992). In command economies, wage bargaining on the labor market is largely absent as the price of labor is determined by central wage-setting policies. As the general aim of wage policies is to keep income inequalities low, manual occupations have relatively high salaries compared to managers, supervisors, and professionals. The absence of a steep occupational wage gradient diminishes both the resource advantages of (relatively) high earning parents and the incentives for their children to pursue (relatively) high earning occupations. In addition, a large range of consumer goods are absent on the market due to economic shortages (Kornai, 1992) and central price-setting kept price differences of products low. Therefore, we do not expect capital differences to be a strong determinant of intergenerational occupational mobility under state socialism in Hungary.

Traditional status attainment models often scale occupations using a combination of the average earnings and education of incumbents (e.g., Blau and Duncan, 1967), a strategy used in recent studies of mobility (Jonsson et al., 2009; Luijkx et al., 2002). However, Hauser and Warren (1997) showed that it is preferable to disaggregate the earnings and education associated with occupations in standard status attainment models, and we believe



the same applies for the scaling approach in mobility table analysis. Moreover, we have theoretical reasons to expect education to play a substantially greater role than capital in shaping occupational transmission in state socialism. Therefore, it is particularly important to scale occupations separately by education and earnings in a mobility model designed explicitly to capture state socialist and post-socialist patterns.

## 2.5. Horizontal linkages

Our model also incorporates horizontal channels of mobility between occupations in the same industry or branch of the economy. Jonsson et al. (2009) observe excess intergenerational mobility between occupations clustered together in certain branches of the economy—e.g., high intergenerational exchange between carpenters and painters, suggesting a construction branch effect.<sup>2</sup> Workers in different occupations within the same branch of the economy often share common values, norms, practices, specific skills, and attitudes (Kohn, 1969; Morris and Murphy, 1959). These similarities are intrinsically ‘horizontal’ because they apply to occupations that can differ widely in terms of socioeconomic resources.

Consider the example of occupations in transportation, which range from general managers of transport companies to aircraft pilots to occupations such as truck driver. These horizontal aggregations of occupations in the same line of work can be seen as intermediary groups that provide a sense of identity, common interests, goals, tastes, and sources of information (Grusky and Galescu, 2005). Returning to our example, transport workers in many industrialized countries have their own formal organizations (such as trade unions) and informal meeting opportunities (yearly balls, sport clubs, charities), which help forge corporate identifications and facilitate reciprocal exchanges of influence and information. These horizontal linkages are likely to affect intergenerational social mobility also because branch-specific human and social capital of children, accumulated during childhood, increases the likelihood of an occupational choice within the same economic branch (Laband and Lentz, 1992, 1983a, 1983b). In our example, a daughter of a locomotive engineer is more likely than average to develop knowledge about and interest in transportation and have more members in her network with ties to transportation. Even if she achieves high educational qualifications and thus chooses a different educational path than that of a locomotive engineer, the chance that she becomes a skilled professional in the transportation sector (e.g., manager at a transport company) is higher than that for daughters from socio-economically similar origins but outside the transportation sector.

We specify intergenerational horizontal effects in occupational mobility by scaling occupations by the extent to which they are embedded in different economic branches (represented by horizontal linkages in the model).<sup>3</sup> Fig. 1 illustrates our model with vertical

<sup>2</sup>Erikson et al. (2012) and Chan and Goldthorpe (2007) relate this form of horizontal differentiation to the concept of occupational “situs,” originally developed by Morris and Murphy (1959).

<sup>3</sup>Were we able to use more detailed occupational codings that incorporated industry as well as occupations, we could in principle use dummy variables to denote presence or absence of an occupation in a particular economic branch. However, given the level of occupational aggregation necessary to support our analysis our best option is to scale each occupation by the percentage of its incumbents who belong to each of the economic branches.

and horizontal components and shows the 17 specific economic branches we use in our model.

### 3. Market transition in Hungary: hypothesized effects on mobility mechanisms

Following the Soviet-supported communist takeover of Hungary in the late 1940s, the state nationalized all economic activity and established central planning bureaus to exercise control over the distribution of resources, including production goods, labor and skills. The agricultural sector was collectivized. Central planning helped modernize the Hungarian economy and establish Hungary as an industrial nation, kept income inequality to a comparatively low level (Atkinson and Micklewright, 1992), and guaranteed life-long employment and job protection for workers. However, ultimately the intrinsic inefficiencies in the planned economy generated chronic shortages and hindered growth (see Kornai, 1992). The regime of János Kádár undertook market reforms in the 1970s in an effort to address some of these inherent problems of the central planned economies and avoid social unrest. The reforms provided greater freedom to state enterprises to respond to market signals and permitted restricted forms of private economic activity, particularly in the provision of goods and services which were lacking in the state sector. Nevertheless, Hungary's economy remained dominated by large state enterprises and the wall between the state and private sectors of the economy prevented the flow of resources, labor, and skill (Róna-Tas, 1994).

After 40 years of single-party rule by the Hungarian Socialist Workers Party, the Velvet Revolutions of 1989 ushered in multi-party democracy, and successive governments implemented radical market reforms. Between 1990 and 1998 restrictions on private property were abolished, enterprises were privatized, planning was eliminated, and state control over the economy evaporated, including centralized wage controls. As a consequence of the privatization of the economy and withdrawal of state control, income inequality and unemployment rose sharply (Atkinson and Micklewright, 1992; Kolosi and Sági, 1998; Róbert and Bukodi, 2004b). The market transition also had a profound impact on occupational careers: between 1991 and 1997 90 percent of men experienced at least one employment transition (either unemployment or job-to-job mobility), and 58 percent reported downward or upward occupational status mobility during this period (Bukodi and Róbert, 2006). However, in Hungary the 'shock therapy' measures did not create a long-lasting crisis, and by the end of the 1990s the Hungarian economy reached a more stable and prosperous phase (Fig. 2).

The potential effects of Hungary's market transition on the parameters in our mobility model result from the collapse of the Communist Party's preeminent position, increasing earnings inequality linked to occupations and (potentially) education, the rise of a new private sector and self-employment, and the withdrawal of the state from the allocation of resources and wages across economic branches. In Hungary's transition the Communist Party lost its central and privileged status both within the economy and within the political system. The legal successor of the Hungarian Socialist Workers Party, the Hungarian Socialist Party was

formed by pro-market reform communists and rose to power in the 1994 elections. However, far from restoring state control of the economy, its leaders joined with the Alliance of Free Liberals to adopt legislation accelerating privatization and economic liberalization. Holdovers from the Hungarian Socialist Workers Party have not reached the parliamentary threshold since the first democratic election. Thus, although orphaned remnants of the socialist-era Communist Party remain in Hungary today, they in no way resemble their deceased parent.

Therefore, the institutional basis for unmeasured advantages accruing to those occupations that were highly saturated with CP members disappeared. A straightforward and intuitive hypothesis follows: in the course of Hungary's market transition, the effects of the power dimension of occupations should diminish and/or disappear entirely. To be sure, Communist Party members appear to have succeeded at 'converting' their former political power into higher earnings in the new market economy (Róna-Tas, 1994; Verhoeven et al., 2008). But this does not contradict the argument that the formal institutional basis whereby occupations were valued based on their association with CP membership no longer held sway after the collapse of state socialism. If CP cadres and/or rank-and-file members managed as individuals to parlay their connections or their CP-based human capital into earnings advantages in market conditions, they did not do so by monopolizing access to occupations that were highly saturated by CP members under state socialism—at least not net of the education, autonomy, and capital now associated with those occupations.<sup>4</sup>

According to Victor Nee's market transition theory, a radical shift from state-orchestrated redistribution to market allocation of resources such as Hungary undertook in the early 1990s benefits private sector employees, entrepreneurs, and the highly educated at the expense of Communist Party cadres (Nee and Cao, 2005; Nee and Matthews, 1996; Nee, 1989). Others have questioned whether markets intrinsically reward human capital and argued that political elites from the state socialist era use their positions or network assets to maintain their advantages following the transition (Bian and Logan, 1996; Gerber and Hout, 1998; Xie and Hannum, 1996; Zhou, 2000; see Keister and Borelli, 2012 for a thorough review). Studies of Eastern European countries such as Hungary tend to find evidence of rising returns to education in the course of the post-socialist transition (Domaski, 2005; Verhoeven et al., 2005). The government's withdrawal from the labor market, the rapid privatization of certain sectors of the economy, and the change from redistributive principles to market principles increased occupational differences in income, as well as a simultaneous increase in overall earnings inequality. Even in sectors which remained in the hand of the state, such as education and health, partial marketization drove the earnings of professionals disproportionately higher.

The growth in overall earnings inequality, emergence of a wage hierarchy typical of market economies, and strengthening of the associations of earnings with occupation and education in the course of Hungary's market transition have potential implications for the effects of occupational education and capital on occupational transmission. But with few exceptions

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<sup>4</sup>See Róna-Tas (1994); Gerber (2001, 2000b); Gerber and Mayorova (2010); and Róna-Tas and Guseva (2001) for a debate over whether former CP members owe their advantages to CP-based network advantages vs. unobserved human capital.

(Gerber and Hout, 2004; Walder and Hu, 2009), the market transition literature focuses on intra-generational mobility, i.e. who were the winners and losers in terms of occupational outcomes after the transition. Gerber and Hout (2004) hypothesize that the strengthening of market principles increases the overall earnings inequality of occupational origins and destinations. Growing earnings inequalities intensify the competition for higher-paying occupations and the negative consequences of having a low-paying occupation. These developments propel intra-generational job mobility involving regression towards origins: those who were downward mobile with respect of their origins because the socialist redistribution system disadvantaged them, but have substantial human and entrepreneurial capital in their family (e.g., children of pre-communist intelligentsia, managers, and large proprietors), are likely to enjoy advantages in the competition and return to the social origins. Those who were upwardly mobile during communism, but do not possess family resources, are likely to be downwardly mobile during market transition. In Gerber and Hout's view, these intra-generational processes produce a strengthening of the origin-destination association.<sup>5</sup> For our purpose, the question is how regression towards origins relates to the effects of education, autonomy, and capital on intergenerational mobility.

The regression towards origins argument may be applicable to the Hungarian case insofar as children of pre-communist elites in Hungary were displaced with respect to the education, autonomy, and capital of their origins. If there was no or little status displacement under communism, return to origins are expected to have a minor or no effect on intergenerational mobility. Former research has extensively investigated whether former elites in Hungary were disadvantaged in education (Simkus and Andorka, 1982; Szelényi et al., 1998), but apart from the increasing odds of lower educated origins to enter higher education during communism, pre-communist professional elites and intelligentsia were able to reproduce their educational capital. In the context of diminished differentiation of occupations on the basis of earnings and autonomy characteristic of state socialism, education remained an area where elites could most effectively pass on their advantages to their offspring.

As education becomes a more important asset on the labor market following transition, one might expect increasing competition for educational resources, strengthening the association between origins and destinations endowed with high educational resources (Collins, 1979; Grusky, 1983). However, earlier research shows that association between occupational class origins and education only slightly increased following the market transition in Hungary, and—contrary to the expectation of market transition theory the education—occupational class destination association even weakened during transition in the 1990s (Bukodi and Goldthorpe, 2009). The smaller-than-expected increase in the origin-education association can be attributed to the simultaneous expansion of tertiary education and professional and clerical jobs. As job opportunities were available to the growing number of graduates the competition for resources did not increase. Moreover, although one can rapidly change jobs and thereby enter a higher-paying or lower-paying occupation or one that involves self-employment to greater or lesser extent, it takes many years to obtain the credentials necessary to enter occupations that require university education of most incumbents. Thus,

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<sup>5</sup>Iván Szelényi's theory on interrupted embourgeoisment (Szelényi, 1988, 1978) is based on somewhat similar processes.

the education dimension of intergenerational mobility should in general be more immune to short-term changes even in the course of radical institutional transformations. For these reasons, we do not expect displacement and return to origins in education, and the association between origins and destinations endowed with high levels of education is unlikely to change during the post-socialist transition.

We do, however, hypothesize that the transition leads to increases in the strength of the effects of occupational autonomy and capital on intergenerational mobility and immobility rates. With respect to capital advantages, sons of former managerial, supervisory, professional, and entrepreneurial elites were clearly disadvantaged in the early communist period (Szelényi et al., 1998). Apart from the likely restoration of the occupational earnings and autonomy advantages of the offspring of pre-Communist elites, the economic resource differentials of occupational origins are expected to increase due to the steeper career earnings profile of occupations under market circumstances (Gerber and Hout, 2004; Gerber, 2002). It is along the dimension of capital that a regression toward origins process should be most salient: as competition for better paying jobs grows, higher-income Hungarian families can use their income-based resources to secure more remunerative occupations for their children. When price differentials across products and services and their availability on the market both increase, so do the 'stakes' associated with obtaining a well-paid occupation. Origin-based inequalities in occupational earnings and autonomy also affect access to cultural resources more strongly during market transition (Bukodi, 2010), which indicates accumulation of cultural capital among the higher strata. Insofar as cultural resources convert to labor market advantage, these processes can lead to strengthening influence of parental social status. We thus expect the strengthening of the association between origins and destinations endowed with high capital during transition.

Despite the expectation that similar intergenerational processes would develop for self-employment as entrepreneurship resurged after Hungary's market transition, intergenerational transmission of self-employment remained weak in the early 1990s (Róbert and Bukodi, 2004a). Instead, self-employment formed a life-stage in the period of transition from school to work (Róbert and Bukodi, 2006), or, subsidized by the government, it was a strategy to escape unemployment (Róbert and Bukodi, 2004b). The character of entrepreneurship changed during transition. The high unemployment figures of the early years of market transition (according to Köll (1995), 13.9 percent in 1993) dropped to 7–8 percent by the end of the decade. High-unemployment, the driving mechanism behind forced self-employment, is also specific to the early phases of transition. The number who were forced into self-employment to avoid being unemployed fell and a new bourgeoisie class emerged in Hungary: a group of large entrepreneurs who gathered entrepreneurial experiences in the second economy during communism and can be considered as winners of the market transition (Kolosi and Sági, 1998). Among these 'real entrepreneurs' greater intergenerational inheritance of entrepreneurship can be expected. Based on these considerations, we expect stronger association between origins and destinations endowed with autonomy especially during the later periods of transition.

Excess mobility within horizontal linkages between occupations in the same industry or branch of the economy is largely based on socialization, networks, and common cultural

capital. These factors apply equally to state socialist and market economies, so on the basis of them alone we have little reason to expect a change in the strength of horizontal linkages. However, under state socialism these social processes promoting horizontal mobility were supplemented by a vertical dimension intrinsically connected to planning. State planners prioritized heavy industry, construction, extraction, and military production over other sectors of the economy: they chronically ignored consumer goods production, services, and agriculture (Gerber, 2012, 2002). Workers in the favored branches enjoyed clear advantages in earnings and other benefits. The inflexibility inherent to the planned economy might have worsened the position of workers in non-prioritized industries. Planning cycles resulted in overinvestment in high-priority industries and projects, which inevitably created shortages that exacerbated competition among industry leaders to gain production resources (Bauer, 1978; Kornai, 1992). The weaker bargaining position of non-prioritized industries intensified the vertical inequalities between workers across horizontal lines. This vertical component of the horizontal dimension is not unknown in market economies, where industries vary in terms of average wages due to a range of political and institutional factors discussed in the ‘new structuralism’ studies of the late 1970s and early 1980s (see Baron and Bielby, 1980; Baron, 1984). But the principles dictating which industries are privileged and which are penalized differ starkly in state socialist and market systems, and market systems do not have planning cycles and related shortages which catalyze industry differences, so the collapse of socialism led to a rapid re-allocation of labor and resources across industries (Gerber, 2012, 2002). Given that the same industries no longer bore the same levels of advantage or disadvantage under the new institutional regime, the vertical incentives for within-industry intergenerational job transmission most likely diminished following the collapse of socialism, even as the other mechanisms producing excess mobility within economic branches in which occupations cluster remained intact. Therefore, we hypothesize that the strength of horizontal ties among occupations declines following the collapse of state socialism.

In sum, our theoretical analysis of the institutional changes connected to market transitions leads us to expect the disappearance of the P effect, stability in the E effect, increases in the A and C effects, and decline (though not disappearance) of the H effects. These hypotheses are summarized in Table 1.

#### 4. Data and measures

Our data come from six different surveys conducted in Hungary from 1983 to 2005 (Table 2), including two from each of three periods: the pre-transition era (pre-1989), the transition era (1989–1998), and the post-transition era (post 1998).<sup>6</sup> We distinguish the transition from the post-transition eras to allow for a gradual (though short) transition from state socialist

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<sup>6</sup>Combining different surveys to perform systematic comparisons over time is a frequently used practice, and there is no real alternative for studies that quantitatively assess the dynamics social processes over long historical periods. Sampling purists may balk at the practice because, in theory, combining different surveys can potentially lead to biased estimates if their sampling frames differ. However, our six Hungarian surveys are very similar. All of them are stratified, nationally representative probability samples of the Hungarian population and were designed with a similar purpose—namely, for studying stratification and mobility processes. Furthermore, we use multiple datasets in each of the three studied periods, which should cancel out idiosyncratic survey errors and increase the robustness of period estimates. Finally, we obtain a stable pattern of results which support our theoretical arguments, and we cannot think of a scenario whereby any bias caused by differing sampling frames would produce such a pattern. Therefore,

and market conditions. The reforms quite likely took some time to have consequences for inter-generational occupational mobility, and there is no a priori basis for specifying the precise timing of changes in mobility. Moreover, privatization in Hungary was a long process, marked by political negotiations and delays (Stark, 1994) which might have prolonged the institutional power of former professional and managerial elites, albeit without manifest political authority, allowing them to invest and transmit occupational resources to their offspring.

We restrict our analyses to non-retired respondents who are employed, self-employed, or temporarily out of the labor force (e.g., on maternity leave). Consistent with recent trends toward disaggregated analyses of occupations, we analyze a 67-category micro-class mobility table. Some of the micro-classes in the original 82-class scheme advocated by Jonsson et al. (2009) were too small or empty and had to be merged with similar small classes. We assign values to each occupation on each of the PEACH dimensions as follows: Power (P) is the percentage of incumbents in occupation who were CP party members during the socialist era, Education (E) is the percentage who completed tertiary schooling, Autonomy (A) is the percentage of self-employed in an occupation, Capital (C) is the percentage of incumbents in an occupation with above-median earnings, and the H dimensions are the percentages within the occupation who work in each of the economic branches listed in Fig. 1.

Scores for A and E were estimated separately for origins and for destinations to reflect inter-generational changes in Hungary in the percentages of self-employed and tertiary educated in different occupational groups during this period. We apply period-specific scores for A and C to capture the effects of growing income inequalities across occupations and privatization of economic sectors. As the transition period saw educational expansion in the tertiary sector, we used period- and cohort-specific scores for E.

Origin and destination scores of P were estimated by pooling the answers from the 1986, 1992, and 1993 surveys. In all three surveys, party membership was measured with reference to the late 1980s. In agreement with our theoretical conjectures, the P scores are fixed at this point in time to measure the political power accrued by occupational groups before the communist party lost its institutional privileges in Hungary.

We set the origin scores of C equal to the C scores estimated for the pre-transition era because the incomes of fathers were not measured in the surveys. However, as the measurement of occupational origins relates to the period when the respondent was 14, the late communist period of income measurement of origins corresponds to the majority of the survey. The descriptive statistics and correlations among our vertical dimensions for each of the three periods we analyze are presented in Table 3.

Note that the correlations are fairly stable, with the noteworthy exception of the correlation between education and capital: consistent with Nee's market transition theory, occupational

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although there is always some risk in combining data from different surveys, in our case the risks are minimal and the benefit of combining surveys—which allows us to test our ideas about the impact of institutional change on intergenerational mobility—is compelling.

education (measured as the proportion of university-educated incumbents) became much more strongly associated with occupational earnings after market transition.

The H scores were estimated from the 1992 dataset which included a detailed industry and branch classification. To prepare our list of horizontal linkages, we started with the list of ‘situses’ originally proposed by Morris and Murphy (1959) then modified the list in consideration of the industrial-agrarian features of the Hungarian labor market. We then calculated the proportion of incumbents in each occupation in the 1992 survey who worked in each economic branch and assigned that as the score for corresponding category. The list of origin and destination-specific PEAC scores per period can be found in Appendix A.

## 5. The estimated PEACH model

Like most studies in the comparative intergenerational occupational mobility literature, we specify our mobility model the occupational level. Unlike individual-level educational and occupational attainment models, the occupation-level analysis separates changes in the underlying inequality of occupational mobility opportunities from inter-generational movement caused by changing labor structure (Hauser, 1978). The aggregate-level modeling approach is especially important when studying the impact of economic–political transitions on inequality because structural mobility is especially salient in such periods. The demise of industrial and—to lesser extent—agrarian economic sectors in the post-socialist economy required inter-generational outflows of younger generations from these sectors in Hungary and other post-communist countries. However, despite greater structural mobility during market transition, the equality of opportunity decreased in this period (Gerber and Hout, 2004; Róbert and Bukodi, 2004a).

For origin occupation  $i$  and destination occupation  $j$ , our core PEACH model takes the following form:

$$\ln(F_{ij}) = \alpha_i + \beta_j + \gamma_1 P_i P_j + \gamma_2 E_i E_j + \gamma_3 A_i A_j + \gamma_4 C_i C_j + \sum_k \theta_k H_{ik} H_{jk} + \gamma_5 D_i A_i^2 + \gamma_6 D_i C_i^2,$$

(1)

where  $\ln(F_{ij})$  is the natural logarithm of the cell frequencies,  $\alpha_i$  and  $\beta_j$  are, respectively, row and column marginal effects – to filter out inter-generational labor structural shifts;  $P$ ,  $E$ ,  $A$ , and  $C$  denote the power, education, autonomy, and capital scores of occupations;  $H_k$  denote the  $k$  horizontal scores;  $D_i = 1$  if  $i = j$  and 0 otherwise, and the  $\gamma$  and  $\theta$  parameters are estimated from the data.

Similarly to Hout (1984), we explain relative immobility by scaling the diagonal cells rather than fitting an overall diagonal parameter or multiple diagonal parameters. The independent variables which we designate to explain immobility are Autonomy and Capital. The two scaled diagonal parameters  $\gamma_5$  and  $\gamma_6$  indicate that for entering certain occupations, property, specific entrepreneurial experience, or high amount of financial capital is needed,



which are likely to be provided by the same occupational origins, leading to higher reproduction in these occupations. While Hout also uses the ‘training’ dimension as a predictor of immobility, our education dimension captures more general effects of human capital than his ‘training’ dimension, so we do not use it as predictor of immobility.

Mobility studies of specific countries often identify specific channels of and barriers to mobility that vertical or horizontal dimensions do not adequately capture. Erikson and Goldthorpe (1992) present a solution by applying effect matrices that capture affinities and disaffinities between particular classes. While this is a parsimonious solution, research practice shows that the patterns of affinities and disaffinities are different across countries (cf. Breen, 2004) which leads to adjustments to these matrices and comparability problems. We take a somewhat different approach, using interactions between particular pairs of our original model terms to capture these channels and barriers. In order to refine our core model, we add the following interactions to Equation (1):

Agriculture branch origin occupation  $\times$  Education of destination occupation (vertical dimension). This term captures a negative association reflecting well-known rural disadvantages in access to education in Hungary (Simkus and Andorka, 1982). Because they are predominantly located in rural areas, children whose fathers work in agricultural occupations have lower odds of entering occupations requiring higher education than children with non-agrarian origins, *ceteris paribus*.

Agriculture branch origin occupation  $\times$  Autonomy of destination occupation (vertical dimension). Due to agrarian collectivization in the 1960s, which turned agrarian workers—including those whose fathers were self-employed—into employees, it should be particularly difficult for farm-origin respondents to take up occupations with high levels of self-employment. This implies a barrier between agricultural-sector occupations and those with high autonomy, net of the other effects.

Agriculture branch origin occupation  $\times$  Educational services branch destination occupation. This term represents a channel—thus positive association—between agrarian origins and teaching occupations. Pursuing careers as school or nursery teacher was a strategy often followed by agrarian families: in our data 49.2 percent of higher educated female respondents from agrarian origins work as school or nursery teachers, compared to those 42.4 of those from non-agrarian origins. Higher educated male respondents from agrarian origins also prefer teaching occupations: 15.9 percent of them chose such careers, compared to 11.3 percent from non-agrarian family origins. The likely explanation for why this channel exists is geographic vicinity: teacher training institutions in Hungary were better represented in small towns and rural areas compared to other higher education tracks, and educational sector occupational opportunities were greater in rural communities (such as primary school teachers) compared to other occupations requiring higher education.

Education origin occupation (vertical dimension)  $\times$  Educational services branch destination occupation. The offspring of highly-educated fathers (as represented by fathers’ incumbency in occupations requiring higher education) are found to be less likely to pursue careers in the

education sector, net of the other effects in our model, due to the lower prestige of educational careers compared to other occupations that require higher education.

Agriculture branch origin occupation  $\times$  Construction branch destination occupation and Construction branch origin occupation  $\times$  Agriculture branch destination occupation. These channels between agrarian and construction occupations reflect the prominence of both types of work in rural labor markets, their shared seasonality, and their typical involvement in the second economy during socialism.

Machine industry branch origin occupation  $\times$  Agriculture branch destination occupation. Under socialism heavy industry was favored by planners while the agriculture sector was regularly neglected, explaining the barrier to (downward) mobility from the former to the latter above and beyond the effects captured by the other parameters in the model.

## 6. Results

### 6.1. Comparisons with other models

We first compare the fit of the PEACH model to that of other frequently used models of mobility in order to assess whether it offers the best representation of Hungarian mobility patterns (Table 4). Data were pooled across periods and weights were applied to equalize the effective sample size for each period. Our preferred measure of fit is the BIC statistic (Raftery, 1995) which is typically used to compare the fit of non-nested models.

Although it hardly merits mention, we follow the convention in mobility studies by noting that the independence model (1) fits the data poorly: occupational origins and destinations are associated in Hungary, as they are in every mobility table ever analyzed. Models (2) through (4) are versions of the 'RCII' association model first developed by Goodman (1979): in these models, a single dimension of row and column scores, constrained so that the row score of an occupation equals its column score, is estimated from data in order to optimize the fit of the model, and the association between origins and destinations is parameterized with a single parameter. Excess densities in the diagonal cells are captured in (2) using topological diagonal terms that map the occupation categories into the larger, widely-used 'EGP' class categories developed by Erikson et al. (1979), in (3) by unique diagonal cell parameters for each occupation, and in (4) by both EGP-class immobility and unique diagonal cell parameters. Consistent with Jonsson et al. (2009) occupation-specific diagonal parameters provide a substantially better fit according to BIC, despite the much greater parsimony of the EGP diagonal specification: immobility is better characterized as within-occupation than within-class. In our data, after accounting for micro-class mobility we obtain a poorer model according to BIC when we add EGP class immobility.

Models (5)–(7) are similar to models tested by Jonsson et al. (2009): they scale occupations by socio-economic status (a linear composite of occupational education and occupational earnings) and specify immobility (in parallel fashion to the RCII models) using EGP classes (5), micro-class diagonal parameters (6), and the two combined (7). The Hungarian data follow the same patterns found by Jonsson et al. for the United States, Sweden, Germany, and Japan: most immobility occurs at the within-micro-class level, but there is also some

excess within-EGP-class movement net of micro-class immobility, because model (7) fits better than model (5). However, all of these models fit substantially worse than the RCII models. This is not surprising, because the RCII models scale the occupations in such a way as to optimize the fit of the model rather than impose an a priori scale (SES) on them. A single SES dimension is unlikely to fully capture how occupations are vertically arrayed.

Next we consider two popular theoretically based models of mobility: (8) the Core Social Fluidity (or CASMIN) model (Erikson and Goldthorpe, 1992) and (9) Hout's (1984) SAT model. It is worth noting that CASMIN model fits better than SAT and also better than the optimal Jonsson et al. model, despite its reliance on the aggregated EGP classes rather than detailed micro-classes to capture mobility patterns.

Model (10) includes only the vertical effects from our PEACH model, and model (11) adds the horizontal effects. Clearly, the horizontal effects are key components of the model, as they substantially improve its fit. Our core PEACH model (11) fits the data better than either CASMIN or SAT, and also better than the Jonsson et al. models. It appears, therefore, that our vertical and horizontal dimensions capture Hungarian mobility patterns more effectively than conventional theoretically-based mobility models. Moreover, the core PEACH model also out-performs the quasi-RC II model with EGP diagonal effects.

When we add the parameters capturing particular channels and barriers to the core PEACH effects (model 12), we obtain a better model than the best alternative, the quasi-RC II model with micro-class diagonal parameters (3). Thus, our expanded PEACH model out-performs a model that scales occupations in order to optimize fit (albeit along a single dimension and constraining row and column scores to be equal) and also explicitly fits excess immobility in every cell along the diagonal (when the PEACH model uses only two parameters to capture excess micro-class immobility). To be sure some of our 'channels and barriers' emerged after inspection of the residuals from the core PEACH model. However, partially data-driven affinity parameters are also features of other theoretically derived mobility models, such as CASMIN and SAT. Most importantly, the core PEACH model fit better than the other theoretically derived models, and the extended model is far less tailored to the data at hand than the RC II models are by their very nature (because they estimate all the occupational scores from the data rather than derive them from theoretical principles). By any reasonable standard, our PEACH model does the best job representing intergenerational micro-class mobility in Hungary.

## 6.2. Gender, period, and cohort differences

We next test for gender differences in the associations represented by the PEACH model<sup>7</sup> and whether there is period variation and to what extent apparent period variation is driven by cohort replacement (Table 5). Jonsson et al. (2009) suggest that associations in the father-daughter micro-class table are weaker than in the father-son table because the resources of

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<sup>7</sup>The PEACH model with gender, period, and cohort differences was parametrized as a Poisson log-linear model with multiplicative interaction (unidiff) and estimated using the GNM 1.0–8 package in R (Turner and Firth, 2006). No statistical packages support estimation of heteroscedasticity-robust standard errors. Other robust estimation methods (such jackknifed standard errors) are too computationally demanding to be feasible with the present data. The authors welcome additional work on methods of robust inference for these types of models.

fathers convert less efficiently to the occupational outcomes of daughters than to those of sons due to gendered occupational socialization.<sup>8</sup> Wong and Hauser's (1992) analyses in Hungary, however, suggest a more complex pattern of father-daughter association: in the 1980s women are less likely than men to inherit their father's occupational class, while their movements into other occupational classes are more strongly determined by origins. In sum, earlier research suggests that is important to test separately for gender differences in immobility and mobility separately.

Accordingly, we test alternative specifications of gender differences in the diagonal and main vertical effects in our model. We specify the following models: (A) no gender differences in the vertical parameters of the PEACH model; (B) a single uniform gender difference across all vertical effects; (C) uniform gender difference in immobility (measured by the scaled diagonal parameters) and uniform gender difference in vertical mobility (measured by the vertical association parameters); (D) uniform difference only on the scaled diagonal association parameters, implying gender differences in the strength of occupational reproduction but not in the scaled association pertaining also to off-diagonal cells; and (E) different vertical parameters by gender (that is, without the proportionality constraint of the unidiff model, thus allowing for different patterns of mobility by gender). We also tested uniform and heterogeneous gender differences in horizontal effects (F and G) and in specific channels-barriers (H and I) using the optimal specification of gender differences in vertical effects as a baseline.

With respect to the vertical components, the uniform difference on the scaled diagonal effects (D, Table 5) is the optimal specification. Although it barely differs from that of the model with uniform difference on all parameters (B), the inferior fit of the model with different unidiff parameters for the scaled main and diagonal parameters (C) indicates that the gender differences in association are most associated with barriers to father-daughter occupational inheritance, consistent with D. Fully heterogeneous vertical parameters by gender (E) fit marginally worse than model (A). Using (D) as a baseline, incorporating either uniform (F) or heterogeneous (G) gender differences in the horizontal parameters leads to inferior models according to BIC, thus we can rule out variation in horizontal effects by gender. However, we did find evidence for gender-specific patterns in the particular channels and barriers we used to expand our core PEACH model: model (I) is our optimal model.

We tested a series of models for change across periods in the horizontal and vertical effects. Our preferred specification of change in the horizontal effects is a single unidiff parameter implying a proportional change in the H parameters during the Transition period but no change from Transition to Post-Transition (P2, Table 5). This model's BIC is better than the model with no change in horizontal effects by period (results not shown), and also outperforms the heterogeneous period effects model as well (P1, Table 5). Therefore, we incorporate a parameter for unidiff change in horizontal effects in our final model specification.

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<sup>8</sup>A more informative solution, which controls for differential sex role socialization to occupations, would be to analyze a mother-father-offspring three-way table (Beller, 2009). This is however not viable for micro-class mobility, as it would result in a table with 67<sup>3</sup> cells, rendering the overwhelming majority of cells empty even in datasets within extremely large number of cases. We therefore restrict our analyses to the less satisfactory but still informative solution of analyzing gender differences in the father-offspring tables.

The model of no change in the vertical parameters (P3) fits better than the model with unique period effect for each vertical parameter (P2). However, our hypotheses imply changes in only a subset of vertical parameters, so free estimation of each parameter in each period is not warranted. We specified a more parsimonious model including only the changes we hypothesized (P4). This model includes a one-time ‘transition effect’ (change in the Transition period but stability from Transition to Post-transition) on the Power dimension, no change for the Education, no effects for Autonomy before the transition but unique effects during the transition and pre-transition, and linear change on the two Capital parameters. This specification outperforms both the heterogeneous vertical effects (P2) and no change models (not shown), providing evidence that the parameters governing occupational mobility did change in Hungary after the collapse of socialism. Below we present the parameters from this optimal specification (Table 6) and interpret them in terms of our hypotheses.

However, before analyzing the period-based changes, we first need to consider whether the apparent period effects actually represent a cohort-replacement. To do so, we defined three cohorts: one born 1940–49 that was fully observed only in the first two periods (because most reached the retirement age of 62 during the Post-transition period), one born 1950–1959 that was observed in all three periods (because they turned 25 in 1984 at the latest and 62 in 2012 at the earliest), and one born 1960–1969 that was observed mainly in the last two because they mostly turned 25 after 1989. Cross classifying these three cohorts by periods and blocking out the two cells with few observations due to the exits of the first cohort and the entries of the last yields seven origin-by-destination tables: two tables for each of the youngest and oldest cohorts and three for the middle cohort. The last four models in Table 5 show the fit statistics for alternative specifications of the changes over time applied to these tables, estimated with cohort-specific scores. Because it is not possible to map some of the period changes onto cohorts, we analyzed heterogeneous period or cohort change on all parameters aside from education (held constant) and horizontal components (constrained to vary proportionally by period and/or cohort).

If what looks like period change is merely cohort replacement, then a model allowing variation in parameters by period only should fit worse than a model allowing variation by cohort only (Gerber and Hout, 2004). In fact, the period specification of change (PC1) fits better than the cohort specification of change (PC2). Moreover, the period specification also fits better than a model allowing full variation by both period and cohort (PC4), and one where all the period change is concentrated in the middle cohort (PC3). The superior fit of the period change model indicates that the change over time follows a period pattern consistent with our arguments regarding the effects of the collapse of state socialism on inter-generational mobility and that, in effect, the changes affect all age groups in the same fashion: there is, therefore, no need to introduce the complicating factor of cohort variation.

### 6.3. Parameter estimates: testing our hypotheses

We examine the period-specific parameter estimates from our preferred model to assess our hypotheses about mobility in Hungary during and after state socialism (Table 6). A diminishing P coefficient would support the hypothesis that the political power associated

with occupations declines in importance or disappears as a mechanism of inter-generational mobility when its institutional bases cease to exist once state socialism is dismantled. Consistent with this expectation, the power dimension played a strong independent role in shaping inter-generational occupational transmission under state socialism (see the coefficient for “Power pre-transition” in Table 6), and that role disappeared with the collapse of the state socialist system (the non-significant coefficient for “Power transition post-transition”, Table 6). Also consistent with our expectations, the influence of the education dimension proved remarkably stable in Hungary across the three periods.<sup>9</sup>

With respect to the autonomy dimension, we expected no effect before transition and an increase in the late period of the transition. The association parameters of autonomy are indeed not significant before transition.<sup>10</sup> Support for our hypothesized increase in the role of autonomy in shaping occupational transmission is somewhat more mixed: the overall association parameter of A is only significant during the Transition period (“Autonomy transition”, Table 6), and its effect for inheritance (diagonal effect) is significant only for Post-transition (“Autonomy diagonal post-transition”, Table 6). Thus, although autonomy did indeed become a more salient basis for micro-class transmission following the collapse of state socialism, it first had a general influence, then acquired a more specific effect in shaping immobility. We are reluctant to speculate on why the increase in the role of autonomy unfolded in this particular fashion, but it is broadly consistent with our expectations.

Capital played a greater role in intergenerational mobility during state socialism than we expected: in particular, capital had a positive and significant effect on immobility during the socialist period (“Capital diagonal pre-transition”, Table 6). The magnitude of the capital effect on immobility did not increase, though, in conjunction with Hungary’s transition to the market (“Capital diagonal linear change”, Table 6). Also consistent with our view that state socialism exhibited distinctive mobility patterns, the effect of capital on mobility between occupations was actually negative during the socialist era (“Capital pre-transition”, Table 6), implying that net of the other effects the children of fathers in low-income occupations were more likely to end up in higher-income occupations, and vice-versa. This suggests that policies discriminating against pre-Communist elites in occupational allocation were at least partly effective (after controlling for occupational education). This negative effect, in turn, diminished after the collapse of socialism (the contrast implied from the model for the transition period:  $b = -0.161$ ,  $p > 0.05$ ) and by late-transition was superseded by a positive, though, non-significant capital effect ( $b = 0.179$ ,  $p > 0.05$ ) (“Capital linear change”, Table 6). Thus, in post-socialist Hungary the influence of capital is felt mainly in occupational inheritance, but as the significant increase on the main scaled effect shows, was emerging for mobility between occupations.

<sup>9</sup>The fit of the model specified with period change on the Education dimension is worse than our preferred period-change model (P4 in Table 5) which specifies no change (  $BIC = +13$ ,  $L^2 = 8$ ,  $df = 2$ ), which supports our claim of stability in the Education dimension across periods.

<sup>10</sup>We tested this claim explicitly by allowing pre-transition Autonomy effects to be estimated freely. However, this model fits worse than our preferred period-change model (P4 in Table 5) which has zero constraints on the pre-transition Autonomy effects (  $BIC = +21$ ,  $L^2 = 0.1$ ,  $df = 2$ ), supporting our hypothesis that there was no Autonomy-effect prior to transition.

Sixteen of the 17 horizontal linkages between occupations have significant and positive effects on micro-class mobility: that is, mobility between occupations is higher to the extent that they score similarly high on the likelihood of being found in the same economic branch. As we hypothesized, the magnitude of these horizontal effects declined (by roughly 13%, given the undiff parameter value of 0.87 for the transition and post-transition eras). Thus, Gerber's arguments about the importance of structural change for understanding earnings and job mobility in Russia's market transition (Gerber, 2012, 2002) appear to be relevant for understanding changes in inter-generational occupational mobility as well.

As noted above, our preferred model includes a uniform gender effect on the strength of the vertical effects on immobility, as well as non-uniform gender differences in the 'channels and barriers' parameters. The effects of autonomy and capital on occupational inheritance are markedly weaker for daughters than for sons, with a undiff parameter of 0.48 ("Female UNIDIFF diagonal", Table 6).

Although we view the channels and barriers (see estimates in Appendix B) as country-specific parameters of lower theoretical interest, we nonetheless note here several interesting gender differences that make intuitive sense. Daughters of fathers in agricultural occupations have elevated mobility into education sector occupations, while sons of such fathers have elevated mobility into construction and lower mobility into high-autonomy occupations. But daughters of construction workers are more likely to enter agricultural occupations. In the socialist era, sons of workers in machine industry (heavily favored by state planners) had exceedingly low rates of mobility into agricultural occupations, and this barrier diminished with the passage to a market system.

## 7. Discussion

Overall, our empirical results support our hypotheses. Most importantly, we find strong evidence that political power was a signature dimension of intergenerational occupational mobility under state socialism that rapidly disappeared when Hungary made its transition to the market. This confirms our argument that state socialism exhibited a distinctive, institutionally-based mechanism of occupational transmission across generations that is not adequately captured by prior mobility models developed to study market based societies. Also confirming expectations, we find that under market conditions the capital and autonomy dimensions became more salient in shaping intergenerational occupational mobility and inheritance than under state socialism. Horizontal, industry-based, differentiation in intergenerational mobility was found to be stronger prior to market transition, relating to the distinctly high privileges some sectors enjoyed in the planned economy of state socialism.

In broad terms, our results show that national political and economic institutions decisively shape inter-generational occupational transmission. Mobility researchers have tended to look for common patterns that characterize mobility in all industrialized societies (Breen, 2004; Erikson and Goldthorpe, 1992; Ishida et al., 1995; Jonsson et al., 2009), seeking variation in the magnitude of inter-generational occupational inheritance and mobility rather than in the mechanisms that govern the associations between parents' and children's occupations. Our

findings from Hungary suggest that comparative mobility researchers should reconsider the possibility that national institutions dictate distinct patterns of mobility.

Market transition may be an extreme case that is uniquely suited for identifying distinctive institution-based mobility regimes. It remains to be seen, of course, whether our findings from Hungary pertain to other former state socialist countries that have undergone market transition. Hungary is usually touted as an economic and democratic success story among transitioning countries, and as such it may be especially likely to exhibit the disappearance of political capital as a dimension of occupational mobility. It could be that in more authoritarian state socialist societies which introduced fewer economic reforms in the 1970s and 1980s Communist Party membership has a longer lasting effect than in Hungary. China would be a particularly interesting test case, because in contrast to all other transition countries aside from Vietnam it has introduced sweeping market reforms without abandoning the leading role of the Communist Party (Walder and Hu, 2009). Accordingly, we might expect political power to continue to operate as a dimension governing inter-generational occupational mobility in China even under market conditions. In any event, our approach can be readily applied in mobility studies of other transition countries, and ultimately our model's applicability to other contexts is an empirical question that can only be resolved with further research.

Apart from market transition countries, mobility researchers may be able to identify other national economic and political institutions that could produce variations in the patterning of inter-generational occupation transmission, such as the extent of formal credentialing within labor markets, the relative strength of between- and within-occupation earnings differences, the rates of unionization and the development of formal institutions at the occupational level, and the degree to which industries vary in terms of wages and other benefits. In some cases, political or religious institutions can intervene with the intergenerational transmission. For example, in rigid caste systems the proportion of incumbents in certain occupations that come from specific castes may be an operative dimension of occupational inheritance and mobility. In highly racialized societies the racial composition of occupations might play a role similar to that of Communist Party membership in our analysis. We believe it would be a fruitful development for mobility research to go beyond perennial debates about the extent to which societies vary in their overall levels of 'openness' and start to look for systematic, theoretically coherent variations in patterns and mechanisms that shape how parents' occupations are linked to those of their children.

Such efforts will be facilitated by the adoption of a micro-class approach to the study of mobility tables. The broader substantive justifications for taking the micro-class perspective instead of using EGP classes or some other big class schema that focus on the degree to which common identities, practices, and rewards emerge and are institutionally reproduced around occupations rather than more aggregate class categories are also relevant when it comes to inter-generational mobility (Jonsson et al., 2009). But expanding the number of occupational categories also increases the degrees of freedom available for identifying multiple dimensions of occupational inheritance. Given the increasing availability of the large data sets necessary to provide the statistical power for the full exploitation of the



additional degrees of freedom, there is less reason to insist on using aggregated class categories.

Recently sociologists have re-invigorated Max Weber's original notion of 'status' as an alternative basis to socioeconomic 'class' in occupational stratification (Chan and Goldthorpe, 2007). Our study of Hungary can be seen as an effort to incorporate the third component of Weber's classic triumvirate of dimensions of inequality in his essay, "Class, Status, and Party." Although political power may be linked less to occupations in developed market societies, state socialism represented a stratification regime in which the life chances linked to a particular occupation were closely linked to its political importance, which we conceptualize as the political power associated with occupations and measure as its degree of Communist Party saturation. Thus, our study continues in the tradition of returning to overlooked features of classic accounts of social stratification in developed societies.

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## Appendix A.

Sample sizes, destination score, and origin score values for 67 occupations analyzed.

Microclass destinations	Pre-trans. N	Trans. N	Post-trans. N	E Pre-trans	E, Trans.	E, Post-trans
Jurists	22	29	49	1.00	0.97	1.00
Health professionals	125	79	69	0.98	0.94	0.96
Professors and instructors	47	38	44	1.00	0.95	1.00
Natural scientists	79	43	12	0.80	0.80	1.00
Statistical and social scientists	130	43	67	0.62	0.61	0.97
Architects	37	16	21	0.92	1.00	1.00
Accountants	95	73	41	0.26	0.64	0.98
Journalists, authors, and related writers	20	17	37	0.71	0.95	0.90
Engineers	320	145	137	0.74	0.83	0.98
Officials, government and non-profit organizations	146	80	54	0.53	0.66	0.91
Managers	501	353	464	0.41	0.56	0.79
Commercial Managers	600	418	253	0.16	0.36	0.70
Systems analysts and programmers	34	30	61	0.65	0.84	0.94
Personnel and labor relations workers	15	12	172	0.53	0.93	0.85
Elementary and secondary school teachers	639	619	527	0.79	0.88	0.99

Microclass destinations	Pre-trans. N	Trans. N	Post-trans. N	E Pre-trans	E, Trans.	E, Post-trans
Creative artists	49	26	50	0.57	0.47	0.77
Professional, technical, and related workers, n.e.c.	649	532	318	0.32	0.53	0.64
Workers in religion	11	12	14	0.91	0.92	1.00
Nonmedical technicians	316	359	264	0.22	0.47	0.74
Health semiprofessionals	242	94	301	0.14	0.55	0.54
Hospital attendants	78	107	104	0.18	0.43	0.74
Nursery school teachers and aides	44	38	32	0.43	0.53	0.72
Other agents	114	134	267	0.29	0.56	0.64
Sales workers and shop assistants	456	488	688	0.03	0.23	0.29
Telephone operators	36	25	8	0.02	0.28	0.28
Bookkeepers and related workers	529	408	322	0.09	0.43	0.62
Office and clerical workers	892	644	405	0.08	0.38	0.49
Postal and mail distribution clerks	76	59	48	0.01	0.08	0.31
Craftsmen and kindred workers, n.e.c.	38	43	152	0.18	0.23	0.25
Production foremen	155	75	137	0.26	0.38	0.61
Electronics service and repair workers	157	135	78	0.04	0.22	0.47
Printers and related workers	45	30	73	0.02	0.28	0.29
Locomotive operators	134	77	14	0.02	0.05	0.52
Electricians	259	204	152	0.04	0.11	0.27
Tailors and related workers	595	350	256	0.02	0.07	0.09
Vehicle mechanics	637	514	227	0.02	0.08	0.21
Blacksmiths and machinists	634	378	352	0.05	0.06	0.11
Jewelers, opticians, and precious metal workers	175	144	80	0.02	0.23	0.30
Plumbers and pipe-fitters	125	122	75	0.00	0.05	0.11
Cabinetmakers	59	52	80	0.12	0.15	0.15
Bakers	69	73	54	0.00	0.07	0.12
Welders and related metal workers	170	118	79	0.00	0.08	0.11
Painters	159	96	90	0.01	0.07	0.05
Butchers	53	52	52	0.04	0.02	0.05
Stationary engine operators	86	88	30	0.03	0.12	0.30
Bricklayers, carpenters, and related construction workers	722	398	253	0.01	0.02	0.08
Heavy machine operators	500	279	161	0.00	0.00	0.07
Truck drivers	579	452	200	0.02	0.06	0.10
Chemical processors	190	111	49	0.04	0.08	0.13
Miners and related workers	208	93	28	0.03	0.07	0.24
Longshoremen and freight handlers	639	314	36	0.02	0.09	0.13

Microclass destinations	Pre-trans. N	Trans. N	Post-trans. N	E Pre-trans	E, Trans.	E, Post-trans
Textile workers	567	391	108	0.01	0.03	0.07
Sawyers and lumber inspectors	176	88	18	0.00	0.01	0.11
Metal processors	297	112	140	0.03	0.10	0.15
Operatives and kindred workers, n.e.c.	889	502	308	0.02	0.05	0.12
Forestry workers	51	51	20	0.00	0.02	0.31
Policeman, firefighters, and members of the armed forces	37	25	156	0.48	0.65	0.67
Transport conductors	23	20	16	0.00	0.20	0.18
Guards and watchmen	47	135	109	0.13	0.31	0.18
Food service workers	397	290	238	0.04	0.09	0.22
Mass transportation operators	200	166	163	0.04	0.09	0.18
Service workers, n.e.c.	612	280	368	0.02	0.11	0.17
Hairdressers	83	77	74	0.07	0.19	0.42
Housekeeping workers	381	277	260	0.00	0.03	0.20
Janitors and cleaners	524	470	211	0.00	0.02	0.05
Farmers and farm managers	179	187	322	0.16	0.17	0.19
Farm laborers	1718	579	33	0.01	0.03	0.06

Microclass destinations	C, pre-trans.	C, trans.	C, post-trans.	A, pre-trans.	A, trans.	A post-trans.	P
Jurists	1.00	1.00	0.96	0.04	0.35	0.26	0.18
Health professionals	0.71	1.00	0.88	0.00	0.02	0.30	0.06
Professors and instructors	0.91	1.00	0.89	0.00	0.00	0.02	0.28
Natural scientists	0.82	1.00	0.83	0.01	0.02	0.07	0.19
Statistical and social scientists	0.89	0.33	0.90	0.02	0.07	0.11	0.20
Architects	0.87	0.25	0.77	0.00	0.00	0.22	0.30
Accountants	1.00	0.78	0.79	0.00	0.04	0.22	0.21
Journalists, authors, and related writers	1.00	1.00	0.65	0.00	0.28	0.44	0.17
Engineers	0.92	0.92	0.79	0.00	0.03	0.13	0.32
Officials, government and non-profit organizations	0.90	0.80	1.00	0.00	0.00	0.00	0.39
Managers	0.77	0.91	0.83	0.03	0.22	0.30	0.30
Commercial Managers	0.67	0.70	0.67	0.12	0.31	0.28	0.14
Systems analysts and programmers	0.60	0.60	0.71	0.00	0.03	0.06	0.06
Personnel and labor relations workers	0.89	0.91	0.78	0.00	0.15	0.10	0.32
Elementary and secondary school teachers	0.73	0.48	0.81	0.00	0.01	0.02	0.18
Creative artists	0.57	0.60	0.54	0.20	0.30	0.40	0.07
Professional, technical, and related workers, n.e.c.	0.85	0.54	0.65	0.01	0.02	0.05	0.21
0.210 Workers in religion	0.50	0.25	0.73	0.00	0.08	0.00	0.00
Nonmedical technicians	0.35	0.59	0.74	0.00	0.01	0.09	0.15

Microclass destinations	C, pre-trans.	C, trans.	C, post-trans.	A, pre-trans.	A, trans.	A post-trans.	P
Health semiprofessionals	0.29	0.21	0.58	0.00	0.01	0.02	0.08
Hospital attendants	0.39	0.36	0.57	0.00	0.00	0.03	0.02
Nursery school teachers and aides	0.00	0.00	0.36	0.00	0.03	0.21	0.13
Other agents	1.00	0.69	0.68	0.00	0.08	0.18	0.14
Sales workers and shop assistants	0.18	0.34	0.19	0.02	0.14	0.25	0.05
Telephone operators	0.22	0.20	0.25	0.00	0.04	0.09	0.03
Bookkeepers and related workers	0.45	0.48	0.62	0.00	0.01	0.06	0.08
Office and clerical workers	0.39	0.36	0.47	0.00	0.01	0.03	0.14
Postal and mail distribution clerks	0.00	0.13	0.23	0.00	0.00	0.00	0.03
Craftsmen and kindred workers, n.e.c.	0.34	0.26	0.47	0.03	0.02	0.01	0.12
Production foremen	0.88	0.67	0.78	0.00	0.05	0.10	0.34
Electronics service and repair workers	0.65	0.38	0.67	0.01	0.10	0.13	0.12
Printers and related workers	0.71	0.00	0.55	0.00	0.06	0.13	0.08
Locomotive operators	0.65	0.67	1.00	0.00	0.00	0.00	0.11
Electricians	0.57	0.48	0.51	0.02	0.05	0.18	0.14
Tailors and related workers	0.22	0.20	0.16	0.11	0.15	0.13	0.06
Vehicle mechanics	0.54	0.40	0.53	0.02	0.04	0.14	0.12
Blacksmiths and machinists	0.61	0.47	0.47	0.03	0.07	0.07	0.12
Jewelers, opticians, and precious metal workers	0.67	0.45	0.51	0.05	0.08	0.13	0.10
Plumbers and pipe-fitters	0.63	0.73	0.40	0.09	0.10	0.25	0.07
Cabinetmakers	0.61	0.43	0.28	0.08	0.23	0.30	0.07
Bakers	1.00	0.10	0.41	0.07	0.10	0.05	0.02
Welders and related metal workers	0.61	0.25	0.49	0.01	0.04	0.02	0.10
Painters	0.62	0.42	0.33	0.14	0.22	0.32	0.05
Butchers	0.40	0.18	0.30	0.02	0.02	0.08	0.09
Stationary engine operators	0.59	0.50	0.58	0.01	0.03	0.00	0.09
Bricklayers, carpenters, and related construction workers	0.47	0.45	0.33	0.07	0.13	0.20	0.06
Heavy machine operators	0.47	0.26	0.33	0.00	0.01	0.05	0.12
Truck drivers	0.59	0.52	0.52	0.02	0.15	0.16	0.10
Chemical processors	0.34	0.33	0.47	0.03	0.03	0.02	0.11
Miners and related workers	1.00	0.93	0.64	0.03	0.05	0.09	0.15
Longshoremen and freight handlers	0.32	0.18	0.14	0.00	0.01	0.08	0.09
Textile workers	0.20	0.19	0.26	0.02	0.01	0.03	0.05
Sawyers and lumber inspectors	0.36	0.36	0.00	0.05	0.06	0.05	0.04
Metal processors	0.66	0.20	0.34	0.00	0.05	0.02	0.11
Operatives and kindred workers, n.e.c.	0.22	0.26	0.22	0.01	0.02	0.03	0.06

Microclass destinations	C, pre-trans.	C, trans.	C, post-trans.	A, pre-trans.	A, trans.	A post-trans.	P
Forestry workers	0.43	0.25	0.42	0.04	0.11	0.17	0.07
Policeman, firefighters, and members of the armed forces	0.82	0.79	0.86	0.00	0.04	0.01	0.52
Transport conductors	0.50	0.60	0.33	0.00	0.10	0.00	0.05
Guards and watchmen	0.27	0.40	0.42	0.00	0.03	0.14	0.03
Food service workers	0.17	0.18	0.30	0.03	0.05	0.12	0.05
Mass transportation operators	0.61	0.53	0.56	0.04	0.18	0.11	0.09
Service workers, n.e.c.	0.25	0.29	0.31	0.05	0.07	0.05	0.07
Hairdressers	0.20	0.31	0.31	0.25	0.61	0.75	0.04
Housekeeping workers	0.03	0.08	0.21	0.01	0.00	0.02	0.01
Janitors and cleaners	0.00	0.07	0.13	0.00	0.01	0.05	0.02
Farmers and farm managers	0.80	0.45	0.23	0.28	0.51	0.44	0.13
Farm laborers	0.26	0.00	0.14	0.03	0.09	0.05	0.06

Microclass origins	Pre-trans. N	Trans. N	Post-trans. N	E Pre-trans	E, Trans.	E, Post-trans
Jurists	44	30	45	0.95	0.97	1.00
Health professionals	69	38	102	0.99	0.97	1.00
Professors and instructors	17	19	31	1.00	1.00	1.00
Natural scientists	65	43	11	0.58	0.86	0.91
Statistical and social scientists	22	16	52	0.59	1.00	0.94
Architects	29	19	57	0.91	1.00	0.93
Accountants	54	40	20	0.30	0.72	0.71
Journalists, authors, and related writers	5	12	8	0.80	0.83	1.00
Engineers	103	100	220	0.65	0.91	0.97
Officials, government and non-profit organizations	98	90	52	0.25	0.64	0.68
Managers	302	229	217	0.22	0.52	0.72
Commercial Managers	294	158	133	0.09	0.28	0.64
Systems analysts and programmers	1	3	2	0.00	1.00	1.00
Personnel and labor relations workers	9	7	42	0.41	0.11	0.66
Elementary and secondary school teachers	174	167	233	0.66	0.88	0.97
Creative artists	77	41	33	0.11	0.20	0.55
Professional, technical, and related workers, n.e.c.	292	254	122	0.33	0.69	0.52
Workers in religion	14	15	8	0.93	1.00	0.88
Nonmedical technicians	66	115	227	0.27	0.65	0.54
Health semiprofessionals	17	3	40	0.00	0.00	0.49
Hospital attendants	7	7	17	0.00	0.29	0.50
Nursery school teachers and aides	6	9	14	0.33	0.89	0.60
Other agents	32	41	65	0.13	0.66	0.58
Sales workers and shop assistants	146	151	226	0.01	0.14	0.19

Microclass origins	Pre-trans. N	Trans. N	Post-trans. N	E Pre-trans	E, Trans.	E, Post-trans
Telephone operators	6	4	4	0.00	0.00	0.42
Bookkeepers and related workers	86	84	95	0.09	0.55	0.63
Office and clerical workers	251	167	101	0.08	0.41	0.39
Postal and mail distribution clerks	82	48	42	0.00	0.08	0.11
Craftsmen and kindred workers, n.e.c.	13	36	257	0.00	0.00	0.09
Production foremen	99	89	157	0.05	0.32	0.47
Electronics service and repair workers	45	33	68	0.00	0.10	0.24
Printers and related workers	19	9	35	0.00	0.11	0.20
Locomotive operators	434	279	66	0.00	0.02	0.10
Electricians	134	155	214	0.01	0.07	0.08
Tailors and related workers	677	433	216	0.00	0.02	0.06
Vehicle mechanics	410	413	277	0.00	0.03	0.07
Blacksmiths and machinists	600	440	752	0.00	0.02	0.05
Jewelers, opticians, and precious metal workers	113	61	85	0.02	0.12	0.23
Plumbers and pipe-fitters	58	77	91	0.00	0.00	0.06
Cabinetmakers	193	115	167	0.00	0.01	0.05
Bakers	74	63	66	0.00	0.02	0.04
Welders and related metal workers	105	106	173	0.02	0.00	0.05
Painters	76	59	100	0.01	0.00	0.00
Butchers	92	76	48	0.00	0.03	0.02
Stationary engine operators	53	52	35	0.00	0.10	0.15
Bricklayers, carpenters, and related construction workers	1408	985	598	0.00	0.01	0.02
Heavy machine operators	331	402	377	0.00	0.00	0.02
Truck drivers	234	340	349	0.00	0.03	0.05
Chemical processors	71	54	39	0.00	0.06	0.03
Miners and related workers	693	528	297	0.00	0.02	0.05
Longshoremen and freight handlers	580	453	130	0.00	0.04	0.01
Textile workers	123	93	77	0.00	0.03	0.05
Sawyers and lumber inspectors	73	62	29	0.01	0.00	0.07
Metal processors	270	138	121	0.00	0.04	0.01
Operatives and kindred workers, n.e.c.	869	664	429	0.00	0.04	0.04
Forestry workers	166	151	59	0.01	0.02	0.17
Policeman, firefighters, and members of the armed forces	71	41	252	0.25	0.36	0.64
Transport conductors	55	74	98	0.00	0.01	0.04
Guards and watchmen	18	20	26	0.00	0.23	0.08
Food service workers	177	143	109	0.01	0.04	0.08
Mass transportation operators	121	115	218	0.01	0.04	0.09

Microclass origins	Pre-trans. N	Trans. N	Post-trans. N	E Pre-trans	E, Trans.	E, Post-trans
Service workers, n.e.c.	879	515	374	0.00	0.02	0.05
Hairdressers	70	34	23	0.00	0.00	0.09
Housekeeping workers	52	29	35	0.02	0.00	0.06
Janitors and cleaners	83	70	55	0.00	0.01	0.00
Farmers and farm managers	2879	1218	1190	0.00	0.02	0.05
Farm laborers	4085	2234	170	0.00	0.00	0.01

Microclass origins	A, Pre-transition	A, Transition	A, Post-transition
Jurists	0.05	0.20	0.07
Health professionals	0.00	0.03	0.04
Professors and instructors	0.00	0.05	0.00
Natural scientists	0.00	0.02	0.09
Statistical and social scientists	0.00	0.06	0.02
Architects	0.03	0.00	0.03
Accountants	0.00	0.00	0.00
Journalists, authors, and related writers	0.00	0.00	0.13
Engineers	0.00	0.04	0.01
Officials, government and non-profit organizations	0.00	0.00	0.00
Managers	0.05	0.04	0.08
Commercial Managers	0.29	0.21	0.02
Systems analysts and programmers	0.00	0.00	0.50
Personnel and labor relations workers	0.00	0.38	0.02
Elementary and secondary school teachers	0.00	0.01	0.00
Creative artists	0.32	0.34	0.09
Professional, technical, and related workers, n.e.c.	0.00	0.00	0.01
Workers in religion	0.00	0.00	0.13
Nonmedical technicians	0.00	0.02	0.02
Health semiprofessionals	0.00	0.33	0.02
Hospital attendants	0.00	0.00	0.00
Nursery school teachers and aides	0.00	0.00	0.00
Other agents	0.00	0.02	0.06
Sales workers and shop assistants	0.12	0.07	0.25
Telephone operators	0.00	0.00	0.00
Bookkeepers and related workers	0.00	0.00	0.00
Office and clerical workers	0.00	0.01	0.00
Postal and mail distribution clerks	0.00	0.00	0.00
Craftsmen and kindred workers, n.e.c.	0.08	0.05	0.00
Production foremen	0.00	0.04	0.00
Electronics service and repair workers	0.07	0.11	0.07
Printers and related workers	0.11	0.11	0.03
Locomotive operators	0.00	0.00	0.00
Electricians	0.06	0.04	0.05
Tailors and related workers	0.37	0.38	0.19

Microclass origins	A, Pre-transition	A, Transition	A, Post-transition
Vehicle mechanics	0.04	0.04	0.03
Blacksmiths and machinists	0.11	0.12	0.03
Jewelers, opticians, and precious metal workers	0.17	0.18	0.11
Plumbers and pipe-fitters	0.07	0.05	0.07
Cabinetmakers	0.29	0.38	0.10
Bakers	0.23	0.21	0.06
Welders and related metal workers	0.06	0.03	0.00
Painters	0.17	0.17	0.12
Butchers	0.25	0.20	0.06
Stationary engine operators	0.02	0.02	0.00
Bricklayers, carpenters, and related construction workers	0.10	0.09	0.08
Heavy machine operators	0.02	0.00	0.00
Truck drivers	0.01	0.03	0.03
Chemical processors	0.03	0.04	0.03
Miners and related workers	0.01	0.03	0.02
Longshoremen and freight handlers	0.01	0.01	0.00
Textile workers	0.06	0.07	0.04
Sawyers and lumber inspectors	0.11	0.11	0.03
Metal processors	0.03	0.01	0.02
Operatives and kindred workers, n.e.c.	0.02	0.02	0.01
Forestry workers	0.04	0.05	0.02
Policeman, firefighters, and members of the armed forces	0.00	0.00	0.00
Transport conductors	0.00	0.03	0.00
Guards and watchmen	0.00	0.00	0.00
Food service workers	0.09	0.10	0.09
Mass transportation operators	0.01	0.05	0.03
Service workers, n.e.c.	0.11	0.11	0.04
Hairdressers	0.51	0.46	0.39
Housekeeping workers	0.11	0.04	0.00
Janitors and cleaners	0.00	0.01	0.00
Farmers and farm managers	0.90	0.73	0.13
Farm laborers	0.16	0.04	0.02

Note: abbreviations of origin and destination scores are P-Power, E-Education, A-Autonomy, and C-Capital.

## Appendix B

Channels and barriers effects from the PEACH model.<sup>a</sup>

	Pre-transition	Transition	Post-transition
Male: Agriculture – Education	-1.429 *** (0.188)	-1.289 *** (0.188)	-0.649 *** (0.173)
Female: Agriculture – Education	-2.656 *** (0.219)	-1.112 *** (0.145)	-0.823 *** (0.151)
Male: Agriculture – Autonomy	-1.61 * (0.788)	-2.104 *** (0.369)	-2.734 *** (0.372)
Female: Agriculture – Autonomy	0.405 (0.807)	-0.287 (0.344)	0.012 (0.336)



	Pre-transition	Transition	Post-transition
Male: Agriculture – Education sector	0.803 <sup>**</sup> (0.304)	0.612 (0.323)	0.379 (0.361)
Female: Agriculture – Education sector	1.538 <sup>***</sup> (0.2)	0.494 <sup>**</sup> (0.174)	0.54 <sup>**</sup> (0.206)
Male: Education – Education sector	-0.976 <sup>*</sup> (0.404)	-0.358 (0.251)	0.51 <sup>*</sup> (0.233)
Female: Education – Education sector	-0.931 <sup>***</sup> (0.267)	-0.857 <sup>***</sup> (0.168)	-0.522 <sup>***</sup> (0.139)
Male: Agriculture – Construction	1.282 <sup>***</sup> (0.221)	1.038 <sup>***</sup> (0.232)	0.964 <sup>**</sup> (0.312)
Female: Agriculture – Construction	-0.554 (0.743)	0.567 (0.929)	-0.619 (1.441)
Male: Construction – Agriculture	1.53 <sup>***</sup> (0.326)	0.152 (0.372)	-0.581 (0.437)
Female: Construction – Agriculture	1.489 <sup>***</sup> (0.341)	1.61 <sup>***</sup> (0.393)	0.55 (0.649)
Male: Machine industry – Agriculture	-1.616 <sup>*</sup> (0.633)	-1.226 <sup>*</sup> (0.595)	-1.079 <sup>*</sup> (0.482)
Female: Machine industry – Agriculture	-1.091 (0.656)	0.051 (0.7)	-0.913 (0.783)

<sup>a</sup> Model estimated on data sets listed in Table 2, and includes period- and gender-specific marginals. Other effects and fit statistics are listed in Table 6.

\*  $p < 0.05$

\*\*  $p < 0.01$

\*\*\*  $p < 0.001$ .

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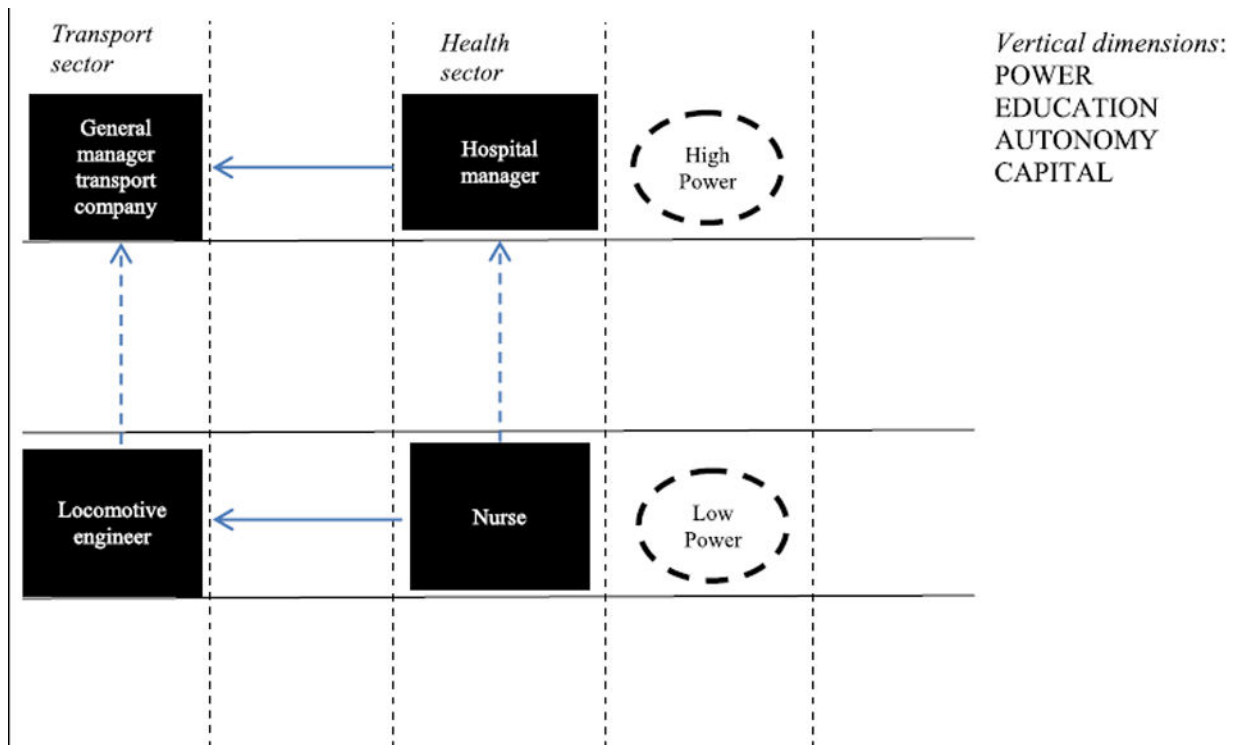
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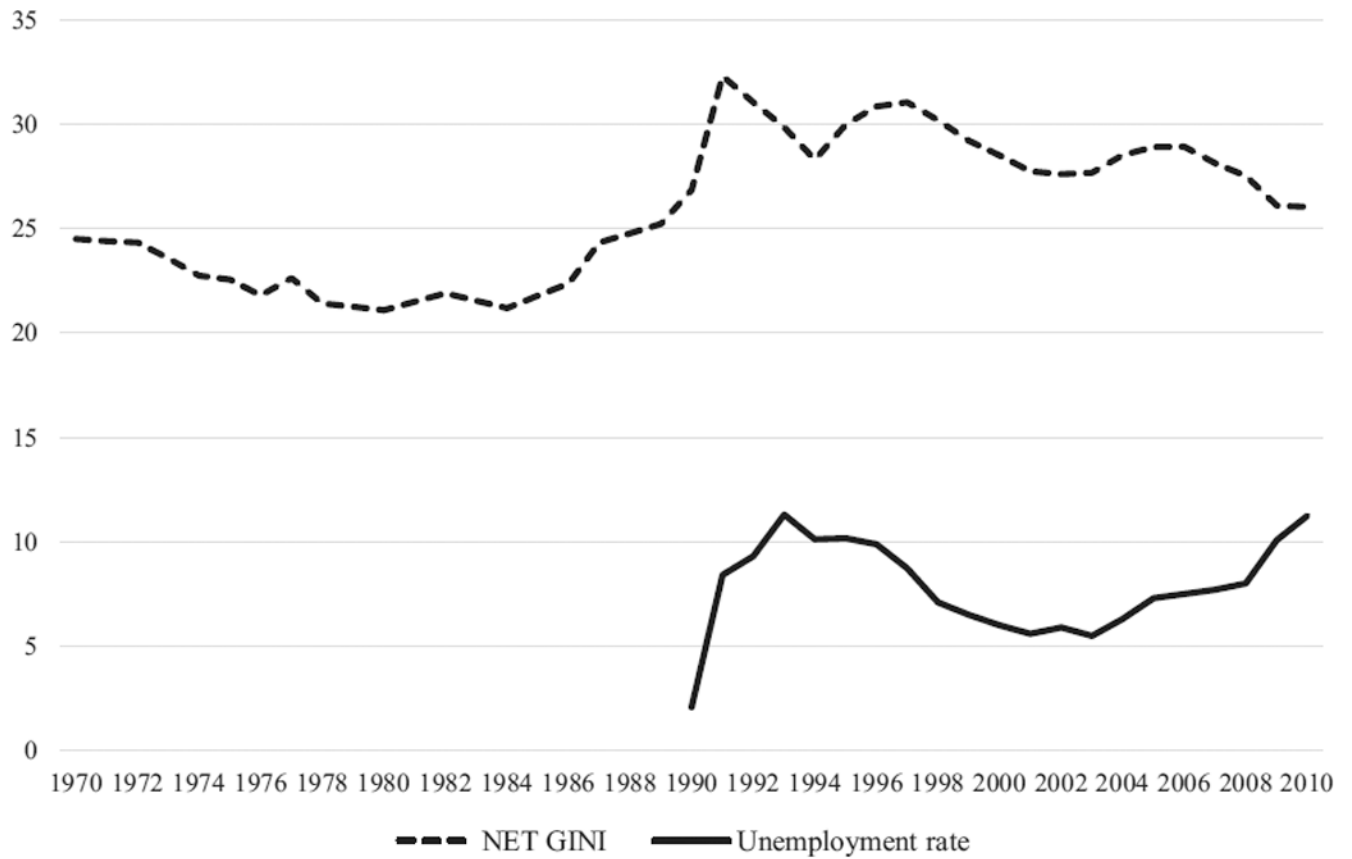


*Horizontal linkages:*

Mining; Machine industry; Chemical industry; Light industry; Food industry; Construction; Agriculture; Forestry; Transportation; Trade; Personal services; Health services; Educational services; Cultural services; Administration and government; Law and police; Public service

<sup>a</sup> horizontal origin-destination movement denoted as “→”; origin-destination movement across one or more vertical dimensions without horizontal movement as “-->”

**Fig. 1.**  
Illustration of horizontal and vertical mobility in the PEACH model.



<sup>a</sup> Sources: NET GINI SWIID Version 3.1 (see Solt, 2009); Unemployment rate: IMF World Economic Outlook (IMF, 2013 April)

**Fig. 2.**  
Hungary: Income inequality and unemployment rate between 1970 and 2010.

**Table 1**

Summary of hypotheses.

	<b>Pre-transition</b>	<b>Transition</b>	<b>Post-transition</b>
Power	++ <sup>a</sup>	0/+	0
Education	+	+	+
Autonomy	0	0/+	++
Capital	0/+	+	++
Horizontal links	++	+	+

<sup>a</sup> ++ Denotes strong positive effect; + weaker positive effect; 0 no effect.

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**Table 2**

Data sources.

Survey <sup>a</sup>	Year	Investigator(s)	N
Social mobility and life history survey	1983	Kulcsár & Harcsa	15,832
General Social Survey	1986	Kolosi	3039
Social mobility and life history survey	1992	Andorka	10,919
Social stratification in Eastern Europe after 1989	1993	Treiman & Szelényi	1850
Way of life and time use survey	2000	Falussy & Harcsa	4231
EU-SILC Hungary	2005	Hungarian Central Bureau of Statistics	5850
Total			41,721

<sup>a</sup>More information on the surveys: 1983/1986/1992: <http://www.harryganzeboom.nl/ISMF/mobdata.txt> (HUN83, HUN86, HUN1992) and on the website of the databank of TARKI (<http://www.tarki.hu/adatbank-e/>); 1993: <http://www.sscnet.ucla.edu/issr/da/SSEE/>; 2000: [http://www.tarki.hu/cgi-bin/katalogus/tarkimain\\_en.pl?sorszam=TDATA-F48a](http://www.tarki.hu/cgi-bin/katalogus/tarkimain_en.pl?sorszam=TDATA-F48a); 2005: <http://www.eui.eu/Research/Library/ResearchGuides/Economics/Statistics/DataPortal/EU-SILC.aspx#time>.

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**Table 3**Scores for Vertical Occupation Dimensions: Descriptive statistics and correlations.<sup>a</sup>

<b>A. Descriptive statistics</b>				
<i>Destinations</i>	Mean	Std	Min	Max
Power	0.12	0.10	0	0.52
education pre-transition	0.23	0.31	0	1
education transition	0.34	0.32	0	1
education post-transition	0.44	0.34	0.05	1
autonomy pre-transition	0.03	0.06	0	0.28
autonomy transition	0.09	0.12	0	0.61
autonomy post-transition	0.13	0.13	0	0.75
capital pre-transition	0.55	0.28	0	1
capital transition	0.46	0.28	0	1
capital post-transition	0.52	0.24	0	1
<i>Origins</i>	Mean	Std	Min	Max
Power	0.12	0.10	0	0.52
education pre-transition	0.17	0.29	0	1
education transition	0.29	0.36	0	1
education post-transition	0.35	0.35	0	1
autonomy pre-transition	0.08	0.14	0	0.90
autonomy transition	0.09	0.13	0	0.73
autonomy post-transition	0.05	0.09	0	0.50
Capital	0.55	0.28	0	1
<b>B. Correlations</b>				
<i>Pre-Transition</i>	Education	Power	Autonomy	
Power	0.50			
Autonomy	-0.16	-0.20		
Capital	0.51	0.62	-0.02	
<i>Transition</i>	Education	Power	Autonomy	
Power	0.55			
Autonomy	0.00	-0.07		
Capital	0.58	0.58	0.18	
<i>Post-transition</i>	Education	Power	Autonomy	
Power	0.55			
Autonomy	0.11	-0.04		
Capital	0.82	0.66	-0.04	

<sup>a</sup>Units of analysis are occupations, unweighted by size.

**Table 4**

Fit statistics for alternative models.

	<b>Model specification<sup>a</sup></b>	<b>L2</b>	<b>df</b>	<b>BIC</b>	<b>p</b>	<b>D</b>
1	Null	16,246	4356	-30,101	0.000	42.9
2	Equal-Quasi RCII EGP diagonal	7567	4278	-37,950	0.000	26.8
3	Equal-Quasi RCII micro-class diagonal	6203	4223	-38,729	0.000	23.6
4	Equal-Quasi RCII micro-class and EGP diagonals	6132	4215	-38,715	0.000	23.5
5	Linear-by-linear SES EGP diagonal	11,457	4343	-34,752	0.000	36
6	Linear-by-linear SES micro-class diagonal	10,226	4288	-35,398	0.000	32.9
7	Linear-by-linear SES micro-class and EGP diagonals	9923	4280	-35,615	0.000	32.3
8	Core Social Fluidity model	9571	4348	-36,691	0.000	31.2
9	SAT model	9921	4351	-36,373	0.000	32.6
10	PEAC model	9556	4350	-36,727	0.000	33.4
11	PEACH model	7851	4333	-38,252	0.000	29.4
12	PEACH model + channels/barriers	7132	4326	-38,896	0.000	27.4

<sup>a</sup>Models 1–12 are estimated on pooled data sets listed in Table 2, weighted in order to equalize effective sample size across periods. N = 41,721.

**Table 5**

Fit statistics for specifications of gender, period, and cohort effects.

	<b>Model specification</b>	<b>L<sup>2</sup></b>	<b>df</b>	<b>BIC</b>	<b>p</b>	<b>D</b>
<i>Gender differences<sup>a</sup></i>						
A	No differences (vertical, horizontal, channels/barriers)	11,170	8748	-81,917	0.000	33
B	A with unidiff (vertical)	11,140	8747	-81,936	0.000	33
C	A with unidiff diagonal and off-diagonal (vertical)	11,136	8747	-81,940	0.000	32.9
D	A with unidiff diagonal (vertical)	11,127	8746	-81,939	0.000	32.9
E	A with heterogeneous differences (vertical)	11,104	8742	-81,919	0.000	32.7
F	D with unidiff (horizontal)	11,133	8746	-81,932	0.000	32.9
G	D with heterogeneous diff (horizontal)	11,065	8730	-81,831	0.000	32.8
H	F with unidiff (channels/barriers)	11,135	8746	-81,931	0.000	32.9
I	F with heterogeneous diff (channels/barriers)	11,037	8740	-81,964	0.000	32.5
<i>Period differences<sup>b</sup></i>						
P1	Heterogeneous (vertical, horizontal, channels/barriers)	14,031	12,978	-1,24,081	0.000	35.4
P2	P1 with transition unidiff (horizontal)	14,089	13,011	-1,24,373	0.000	35.7
P3	P2 with no difference (vertical)	14,168	13,023	-1,24,422	0.000	35.8
P4	P2 with transition model (vertical)	14,111	13,018	-1,24,426	0.000	35.7
<i>Period and cohort differences<sup>c</sup></i>						
PC1	Period differences	21,128	30,436	-3,00,640	0.999	42.8
PC2	Cohort differences	21,174	30,436	-3,00,595	0.999	42.9
PC3	PC2 with period differences for middle cohort	21,085	30,410	-3,00,409	0.999	42.6
PC4	Full period/cohort differences	21,072	30,384	-3,00,147	0.999	42.6

<sup>a</sup>Models A–I include gender-specific marginal destination effects and gender-common marginal origin effects. Gender-specific marginal origin effects were tested but did not differ by gender.

<sup>b</sup>Models P1–P4 are estimated with period-specific origin and destination marginals. Transition model on vertical effects in P4 is specified as follows: *Power*: transition effect, *Autonomy* parameters: no effect before transition, *Capital* parameters: linear change over period; *Education*: no period change.

<sup>c</sup>Models PC1–PC4 are estimated on with period-cohort specific marginals. The satisfactory model fit is due to the large degrees of freedom relative to the (reduced) sample size. In all models *Education* cohort and/or period differences are constrained to zero, and horizontal effects are constrained to unidiff change over period and/or cohort. The middle cohort (born 1950–1959) was observed in all three periods.

**Table 6**Origin–destination association parameter estimates from the peach model.<sup>a</sup>

Vertical effects		Horizontal effects			
Power pre-transition	10.425 <sup>***</sup> (1.567)	Transition UNIDIFF	0.868 <sup>***</sup> (0.053)	Transport	1.141 <sup>***</sup> (0.198)
Power transition-post-transition	-1.141 (0.835)	Mining	2.097 <sup>***</sup> (0.347)	Trade	1.045 <sup>***</sup> (0.24)
Education	4.175 <sup>***</sup> (0.099)	Machine industry	2.875 <sup>***</sup> (0.399)	Personal service	2.175 <sup>***</sup> (0.446)
Autonomy transition	1.865 <sup>***</sup> (0.479)	Chemical industry	8.849 <sup>***</sup> (1.571)	Health services	1.991 <sup>***</sup> (0.295)
Autonomy post-transition	0.113 (1.283)	Light industry	0.541 <sup>**</sup> (0.165)	Educational services	0.499 <sup>***</sup> (0.146)
Autonomy diagonal transition	-0.534 (0.634)	Food industry	1.656 <sup>**</sup> (0.525)	Cultural services	8.475 <sup>***</sup> (1.206)
Autonomy diagonal post-transition	5.146 <sup>*</sup> (2.094)	Construction	2.118 <sup>***</sup> (0.296)	Administration & government	-0.494 (0.658)
Capital pre-transition	-0.503 <sup>***</sup> (0.138)	Agriculture	2.199 <sup>***</sup> (0.112)	Law & police	3.138 <sup>**</sup> (1.199)
Capital linear change	0.341 <sup>***</sup> (0.094)	Forestry	5.267 <sup>***</sup> (0.594)	Public service	3.791 <sup>***</sup> (0.503)
Capital diagonal pre-transition	0.406 <sup>***</sup> (0.035)				
Capital diagonal linear change	0.034 (0.025)				
Female UNIDIFF diagonal	0.48 <sup>***</sup> (0.071)				

<sup>a</sup>The model is estimated with Poisson (count) response and log-link on pooled data sets listed in Table 2, and includes period- and gender-specific marginals, and period and gender specific channels and barriers (estimates listed in Appendix B). Datasets weighted in order to equalize effective sample size across periods. A small constant (0.001) was added to avoid empty cells.  $N = 41,721$ ,  $L^2 = 21,377$ ,  $df = 26,262$ . Standard errors are in parenthesis.

\*  $p < 0.05$ ,

\*\*  $p < 0.01$ ,

\*\*\*  $p < 0.001$ .