THE INHERITANCE OF EMPLOYERS AND NONLINEARITIES IN INTERGENERATIONAL EARNINGS MOBILITY

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Abstract

Our analysis of intergenerational earnings mobility modifies the Becker-Tomes model to incorporate the intergenerational transmission of employers, which is expected to increase the intergenerational earnings elasticity. The intergenerational transmission of employers is positively related to paternal earnings and rises discretely at the top of the distribution. We use a switching regression model and identify two regimes associated with the inheritance of employers that have different intergenerational earnings elasticities. The results demonstrate that the inheritance of employers can help explain observed nonlinearities in intergenerational earnings transmission, and particularly the preservation of economic status at the very top of the earnings distribution.

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1. Introduction

A growing literature addressing the intergenerational transmission of earnings often forms the backdrop for policy discussions dealing with equality of opportunity. This literature is generally framed in the context of a linear regression to the mean model, and motivated theoretically by models of parental investments in the human capital of their children as in Becker and Tomes (1986, 1979) and Loury (1981). The major concern of the empirical research has been the challenge of correctly estimating the elasticity of earnings between parents and their children in the presence of measurement errors and life cycle biases. Atkinson, Maynard, and Trinder (1983), Solon (1992, 1989) and Zimmerman (1992) offer a starting point that has led to a large number of studies from a number of countries, surveyed by d'Addio (2007), Björklund and Jäntti (2009), Black and Devereux (2010), Corak (2006), and Solon (2002, 1999). Böhlmark and Lindquist (2006), Grawe (2006), Haider and Solon (2006) and Nybom and Stuhler (2011) represent some of the most recent methodological developments.

Though this research is highly descriptive it has also led to a greater appreciation of causal processes. Attention to sibling and neighbourhood effects, as in for example Björklund *et al.* (2002), Björklund, Lindahl, Plug (2006), Oreopolous (2003), and the research summarized in Solon (1999), suggests that within family, as opposed to peer or neighbourhood, influences play the central role in determining the degree to which a child's life chances are tied to socio-economic background. As such these findings have

1

links to the growing research on early childhood development, the formation of values and preferences, and their impact on readiness to learn and pro-social behavior that are important antecedents to educational attainment and ultimately labour market success.

While this certainly relates to discussions of equality of opportunity, there at the same time seems to be less emphasis on the structure of labour markets; the constraints or barriers embedded in them, and access to particular occupations or jobs, issues that traditionally also spoke to this policy concern. In fact, studies of the demand side of the labour market describe persistent differences in wages across firms and industries, as for example in Abowd, Kramarz, Margolis (1999) who examine wage differences between small and large firms or in Krueger and Summers (1988) who discuss inter-industry wage differences. These studies and an associated literature documenting within-industry firm differences, as for example in Baldwin (1998), suggest that more productive and more highly-paid workers are concentrated in particular firms.

It is also well-known that on the supply side families and friends play important roles in the job search process. Datcher Loury (2006) suggests that up to 50% of jobs are found through family, friends or acquaintances, and also shows that the highest wages are paid to those who find jobs through "prior generation male" relatives who actually knew the potential employer or served as a reference. In this US study roughly 10% of men found jobs in this way.

If the demand side of the market is structured into high and low paying firms and if close family relatives play an important role in passing on jobs, then is it possible that the degree of intergenerational earnings mobility has something to do with not only human capital investment when children are young, but also with the firms with which

2

they are employed as adults and the possibility that these firms are in some sense transmitted across generations? This is the question that motivates our research.

Our analysis of intergenerational earnings mobility focuses on the role that parents may play in structuring the child's interface with the labour market, in the extreme influencing the degree to which employers are passed on across the generations. We examine this issue with a large administrative data set on a cohort of Canadian men containing information for both fathers and sons on up to four employers per year, starting in the year the child was 15 years old and continuing to early adulthood. The sample sizes available to us and the quality of the earnings data allow us to focus attention on specific points in the earnings distribution, particularly the upper tail. As such our analysis speaks to the potential long run dynamics associated with the significant increases in income shares accruing to top earners that has been documented by Atkinson and Piketty (2007) and a host of associated research papers, with the Canada-United States comparison by Saez and Veall (2007, 2005) being most pertinent.

To the best of our knowledge, the implications of changes in cross-sectional inequality at the top of the distribution for the transmission of inequality across the generations have not been adequately addressed. The work by Björklund, Roine, and Weldenström (2012) is the only study focusing explicitly on intergenerational mobility at the top of the income and earnings distributions. They document a very high degree of transmission from fathers to sons in the very top of the distribution and explore the potential mechanisms explaining this persistence. They find that IQ, non-cognitive skills, and education of the sons are not the most likely transmission channels, while the inheritance of wealth might play a major role.

We show that the intergenerational transmission of employers can help explain the observed nonlinearities in the intergenerational transmission of earnings. In the first part of the paper, section 2, we draw on Mulligan (1999, 1997) to derive a number of insights from a reformulation of Becker and Tomes (1986). This analysis motivates our empirical model, and argues that parent-child earnings will be causally linked even in the context of perfect capital markets if employers are transmitted across the generations. The possibility of inheriting an employer raises the intergenerational earnings elasticity, and introduces a nonlinearity that varies positively with paternal earnings. This framework motivates the use of a particular version of a switching regression model in our empirical analysis, which is pursued along with a description of the data in sections 3 to 5 of the paper. We find that the intergenerational transmission of employers tends to increase the intergenerational elasticity of earnings, a result that is clearest in the absence of credit market constraints and heterogeneity in other endowments. We find that it is strongly associated with the preservation of top earning status across generations. These findings are discussed in the final concluding section.

2. Theoretical framework

The general structure of models dealing with the intergenerational transmission of inequality involves a two period horizon in which parents use their income both for consumption and for investment in their children during the first period, while children work and consume as adults in the second period. The maximization problem involves parents allocating their endowment between current consumption and expenditures that will increase the earnings capacity, and hence future well-being, of their children. A

simplified version of the earnings generating function for the child in adulthood, as presented in Becker and Tomes (1986), is offered as equation (1), where for convenience individual level subscripts are suppressed.

$$ln\ Y_t = \gamma_t\ H_t + \lambda\ E_t + l_t \qquad (1)$$

The earnings of an individual of generation t are represented as Y_t, and are related to the human capital of the individual, H_t, its valuation in the labour market, γ_t, and market luck l_t. E_t is thought of as ability. It affects earnings directly, and in most of this literature is also a catch-all for the cultural or genetic attributes of the family that are passed on to the child in a way not determined by parental control, and hence not responsive to incentives. It affects earnings indirectly by influencing investments in human capital, which is accumulated during childhood as a result of private expenditures of parents.

These endowments are assumed to be transmitted mechanically across generations according to a Markov process as given by, to use notation similar to Becker and Tomes (1986), equation (2).

$$E_t = \alpha_t + hE_{t-1} + v_t \qquad (2)$$

Parents observe the endowments of their children, and make human capital investments that are subject to a diminishing marginal return. All parents are able to make the optimal investment, notwithstanding their income or the ability level of their children, if capital markets are assumed to be perfect. This assumption permits even low income parents of high ability children to make the optimal level of investment. In this way the human capital and hence earnings outcomes of children are separated from parental income, and the intergenerational transmission of inequality is determined by the degree to which

5

ability is transmitted across the generations, as given by h.[1] The fact that earnings regress to the mean according to the inheritability of endowments, and independently of parental earnings, is a key result in this strand of the literature.

In Loury (1981) and Becker and Tomes (1986) it is recognized that some parents may not be able to invest the optimal amount of human capital in their children if there are borrowing constraints in financial markets that prevent the passing on of debt for repayment in the next generation from the increased earnings of the child. Parents must fund these investments by reducing their own consumption. This implies that the cost of funds are not the same across families, and also that they are increasing in the level of expenditures on the child's human capital as the reduction in consumption raises the shadow cost of additional expenditures. This is reflected in equation (3) by the positive influence of parental income in the educational attainment of children.

$$H_t = \delta\, E_t + \theta\, lnY_{t-1} \,,\; \theta \geq 0 \qquad\qquad (3)$$

When $\theta > 0$ capital markets are not perfect so that the child's level of human capital depends on parental income: the child's human capital is higher the more able the child, but also the higher the parental incomes. Some families will have enough income to make the optimal level of expenditures, but this will not be the case for other families. In the presence of borrowing constraints, earnings will persist across generations both because of inheritable endowments and because of sub-optimal human capital investments. The intergenerational elasticity for the population as a whole displays a non linearity concave in parental earnings. As such, imperfect capital markets imply that child earnings will be related in a causal sense to parental earnings.

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[1] As Mulligan (1997) makes clear this also assumes that parental preferences are homothetic and therefore that the degree and nature of intergenerational altruism implies linear expansion paths.

We augment this model by introducing the possibility of intergenerational transmission of employers. Following Mulligan (1999, 1997 pp. 55-7), we suggest that endowments have two dimensions: one that shifts the earnings function in a way that alters marginal returns and determines the efficient level of human capital; another that shifts it in an additive way and does not alter its slope. We suggest that the intergenerational transmission of employers is an endowment of this latter sort, reflecting the capacity of parents to influence the outcomes of the child's job search. The maintained assumption is that this is something that only happens after human capital investments are completed.

We also assume that this capacity is positively related to parental earnings, an assumption that we show later is justified by the patterns in our data. It is important to note that different hypotheses for the existence of a positive relationship between parental earnings and the intergenerational transmission of employers can be found in the literature. For example, Shea (2000), among others, hypothesizes that fathers in unionized jobs are able to pass on employment with the same firm to their sons. Further, the union-non union wage premium implies that the children of these relatively higher earning fathers will also get a relatively higher wage offer from the firm. More generally, Atkinson, Maynard and Trinder (1983) note that when local labour markets are dominated by a single employer, it is more likely that sons would be employed at the same firm as fathers even in a non-unionized setting. Further, this being a dominant or large employer in the labour market may also suggest a dominant position in product markets so that the firm's revenues may incorporate a rent that is shared with workers. The intergenerational transmission of employers could also be positively related to

parental income because the degree of control parents have in the hiring policies of the firm may increase with income. In the extreme we can imagine parents being the owners of the firm and exerting preferential hiring of relatives. The literature on the succession of CEOs as in Pérez-González (2006) for the United States, and Bennedsen *et al.* (2007) for Denmark can be offered as an example of this possibility.[2]

Finally, we also note that the possibility of inheriting an employer may impact the earnings outcomes of children through their reservation wage. For a given job offer distribution the availability of a job in the father's firm, something the child knows with certainty, will lead to higher reservation wages in the same way that the availability of an independent source of income like unemployment insurance increases the reservation wages of the unemployed.[3] Individuals with higher earning parents will have higher reservation wages and therefore higher earnings. If this is the case, then the son's adult earnings may be influenced by the possibility of inheriting his father's employer even if he does not ultimately work for this firm. This is particularly relevant for the empirical implementation of our model.

The possibility of being employed with the same firm that employed their parents is information available to children, and its impact on earnings is transmitted across the generations in a manner different than depicted in equation (2) for other endowments. In

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[2] The incidence of family based succession is high in the US data used by Pérez-González (2006), more than one-third of the slightly over 300 successions among publicly traded companies. As such this raises the possibility of nepotism as the mechanism for the intergenerational transmission of employers in a way that suggests a positive correlation with parental income. Bellow (2003) offers a much broader picture by offering a historical look at nepotism with a focus on the United States. He distinguishes between "good" nepotism and "bad" nepotism. The former might be interpreted as fathers passing firm specific human capital to their sons that raises their productivity in the family firm; the latter as the hiring of sons entirely because of family connections with no regard to productivity. Rosenzweig and Wolpin (1985) explicitly model the development of firm specific human capital across the generations.

[3] See Lancaster and Chesher (1983, pp. 1664-65). This result holds if a marginal change in one firm's wage does not change the distribution over all firms.

particular we suggest that the earnings generating function in equation (1) be modified as follows.

$$ln \ Y_t = \gamma_t \ H_t + \lambda \ E_t + \phi \ lnY_{t-1} + u_t \qquad\qquad (4)$$

In equation (4) earnings depend upon two types of endowments, ability E_t and the earnings impact of parental contacts represented as $\phi \ lnY_{t-1}$, where $\phi > 0$ indicates that fathers with greater earnings are more able to pass on employment in higher paying firms.

Equations (3) and (4) imply that $ln \ Y_t = (\phi + \gamma_t \ \theta) \ lnY_{t-1} + (\lambda + \gamma_t \ \delta) \ E_t$. So for children of the same ability E_t , the child with higher earning parents will have higher expected earnings. This occurs for two reasons. First, higher income families are less severely constrained in the capital market. In the standard borrowing constraints model with one dimension of ability this effect is given by $\gamma_t \ \theta$. But this impact is accentuated by the presence of the second type of endowment so that the ultimate elasticity between parent and child earnings for children with equal E_t is $(\phi + \gamma_t \ \theta)$. The presence of the intergenerational transmission of employers implies any given difference in income between parents of equally endowed children will lead to a higher difference in the longer run earnings of children because higher paid parents have a higher wage employer to pass on to their children.

As in the standard formulation, this framework motivates and informs the use of a linear regression to the mean model of intergenerational mobility: $ln \ Y_t = \alpha + \beta \ lnY_{t-1} + \varepsilon_t$, where β, the intergenerational earnings elasticity, is the parameter of interest in need of interpretation. Following the calculations in Solon (2004) we derive β to be:

$$\beta = \frac{(\phi + \gamma_t \theta) + h}{1 + (\phi + \gamma_t \theta)h}. \tag{5}$$

This derivation clarifies that when both effects are in play, $\theta > 0$ and $\phi > 0$, the shape of the intergenerational earnings relationship is indeterminate. As such, nonlinearities cannot be used to test the predictions of the model without specifying how β varies across the population. This is a result of the existence of both credit market distortions and the transmission of job contacts.

In the standard formulation $\phi = 0$. In this context the model distinguishes a regime in which capital markets are perfect, with $\theta = 0$ and therefore $\beta = h$, from a regime in which parents are not able to borrow against the future earnings of their children, with $\theta > 0$, and $\beta = \frac{\theta \gamma_t + h}{1 + \theta \gamma_t h}$, which is greater than h when θ is positive. In Becker and Tomes (1986) this latter regime is described to be the case for low income families, and as such a direct channel is opened between the earnings of parents and their children. This model predicts a non-linear and concave relationship between parent and child earnings. Alternatively, in the context of a linear specification the intergenerational earnings elasticity for the population as a whole is higher than it otherwise would be, and is driven by the higher elasticity at lower earnings levels. The two regimes, $\theta = 0$ and $\theta > 0$, are often distinguished by whether parents make financial transfers to their children or not, as in Mulligan (1999).[4]

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[4] Grawe (2004), Grawe and Mulligan (2002), Han and Mulligan (2001) point out that with heterogeneity in child abilities and parental altruism the relationship between parental income and being credit constrained is not straightforward and cannot be easily determined empirically. This in large part motivates Guo (2009) to frame this model in terms switching regressions with sample separation unknown or uncertain.

Assume $\theta = 0$, so that capital markets are perfect, and that $\phi > 0$. Then

$\beta = \dfrac{\phi + h}{1 + \phi h}$, but in this case the higher intergenerational elasticity holds at higher

earnings levels since parents with higher earnings pass on another type of endowment to

their children. In other words, this model also predicts a nonlinear relationship between

the logarithm of parent and child earnings, but convex in nature with a higher elasticity at

higher parental earnings because the children of these parents are both more likely to

inherit an employer, and more likely to inherit a higher paying employer. The

intergenerational elasticity for the population as a whole is higher than it otherwise would

be, but now is driven by the higher elasticity at higher earnings levels. In a similar

manner this suggests that the population consists of a mixture of two types of individuals,

and raises the issue of whether and how these regimes can be empirically identified.

There are two important caveats to our theoretical framework. The first concerns

the assumption that the transmission of employers is an additive endowment. For

example, Magruder (2010) adapts the Becker-Tomes earnings generating equation in a

way that emphasizes a multiplicative role for parental networks by stressing that human

capital investments can only generate returns when individuals are in fact working.[5] More

generally, working for a particular employer may influence the return to human capital

and therefore alter incentives and the optimal amount of investment in education. It is not

immediately clear in which direction this effect works. On the one hand it is easy to

imagine that there may be a certain level of education required to gain employment with

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[5] He finds that "all of the constraints to economic mobility reviewed in the literature are exacerbated in the presence of intergenerational networks." (Magruder 2010, page 67) This result differs from our analysis by not incorporating a relationship between parental income and the capacity to act as a source of job referrals to the child. But the point is that accounting for this formulation will not change our results.

the father's firm, or to particular positions in the firm. On the other hand, it is also

observed in the literature on the determinants of self-employment that the children of the

self-employed may exert less effort in education, as for example in Gevrek and Geverk

(2010). These children are more likely to have entrepreneurial intent, or are more likely

to be hired by their parents, and as a result they are more likely to cut their education

short.[6]

The second caveat is that it is not immediately apparent that the intergenerational

transmission of employers can be distinguished from other types of endowments that may

also be additive in their impact on earnings. These may include time preference, risk

aversion, entrepreneurship, and other aspects of personality including physical traits like

beauty. These endowments may also vary positively with parental incomes, and perhaps

distinctly so at the upper tail of the earnings distribution in the manner of Rosen (1981),

with marginal differences in endowments implying significantly greater earnings. This is

certainly the most important challenge in empirically implementing our framework.

Although we cannot exclude the possibility of unobservable traits affecting both the son's

decision to work for his father's employer and his earnings, we attempt to address this

issue by introducing measurable markers for time preference and entrepreneurship.

In addition to these concerns, the other empirical issue that follows from our

model is that the observed incidence of same employers across the generations

understates the influence of employer inheritance because sons of high enough ability

may have higher earnings with other employers. Even so, the opportunity to inherit the

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[6] Our maintained assumption is equivalent to the usual assumption in the Becker-Tomes model that
individual endowments are not correlated with parental income, that demand curves for human capital
investment do not shift when parental income changes. The results are ambiguous when both curves shift.
The original formulation in Becker and Tomes (1979) assumes that parents can invest in the endowments
of their children, but this is generally not the case in the literature.

father's employer conditions their reservation wage and leads to higher earnings.[7] In other words, the information on whether a son actually works at the same employer as his father is not a perfect measure of whether or not he had a possibility of inheriting an employer from his father, and this needs to be recognized in the empirical analysis.

3. Nature of the data and some preliminary results

Our analysis is based upon the Intergenerational Income Data (IID) we developed at Statistics Canada from administrative information on individual income tax returns that have been grouped into families. While we have information on a number of cohorts of young men, our focus is on the oldest group at the time we began our analysis, those who are 33 years of age in the last year of observation. We observe their earnings in each year they file income taxes from the age 15 onward, and more importantly the earnings of their fathers since that time. For each year between 1978 and 1996 we also observe up to four employers that the sons and the fathers may have had. The appendix discusses the data in more detail.

Table 1 presents basic descriptive information. Father's earnings are averaged over the five year span in which the son was 15 to 19 years of age. To remain in our analytical sample the father must have positive earnings in each of these five years.[8] On

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[7] For that matter the observed incidence of intergenerational transmission of employers could also overstate the influence on a child's earnings in the sense that employers may be found independently of any parental role, particularly if labour markets are segmented geographically and there are only a few employers in the location for which job search occurs. If the allocation of employers were random there would be a possibility that some sons will work for the same employer as their sons, and this would have nothing to do with the job contacts and networks of the father that sons may rely on, with firm specific human-capital investments parents make in their children, or with nepotism.

[8] This is the preferred sample selection rule in Corak and Heisz (1999). They show that averaging over a five year horizon is long enough to correct for transitory earnings fluctuations. Mazumder (2005) suggests that almost twice as many years are necessary to correct for persistent transitory earnings fluctuations in the US administrative data he uses. However, unlike these US data the earnings information from the IID is not

average fathers are in their mid to late forties when we estimate their permanent earnings.

Sons' earnings are averaged over a three year period, 1994 to 1996, conditional on

reporting positive earnings in each of these three years. As such the sample of sons is

relatively young. This is likely to lend a downward bias to estimates of the

intergenerational earnings elasticity. This is one reason we focus most of our analysis on

the oldest available cohort. This restriction also simplifies many of the calculations and

makes the sample size—at just over 70,000—more manageable.

   We work with a particular definition of whether or not a son is employed by the

same firm as his father. It refers to the "main" employer of the father and the son, the

employer accounting for the majority of earnings. We restrict this to mean the employer

representing the majority of the father's earnings during the years the son was 15 to 19

years of age, and the employer accounting for the majority of the son's earnings when he

was between ages 30 and 33. Just below six percent (5.9%) of this cohort of young men

have as their main employer in adulthood the same main employer their fathers had when

they, the sons, were between 15 and 19 years old.

   In fact, the lifetime incidence of the intergenerational transmission of employers

is much higher: 41% of 33 year olds are or have been employed at some point since the

age of 16 with an employer who also employed their father at any point in the past.[9] In

other words, many more sons have at some point been employed with at least one of their

top coded. Chetty et al (2014a,b) use of US administrative data is not limited by top coding, and they suggest that measurement error is reduced with even fewer years of averaging.

[9] We derive this statistic by defining a vector of same-employer indicators that are set equal to one in year t if any of the son's employers in year t were the same as any of the father's employers over the period 1978 to $t-1$ inclusive. This definition of the intergenerational transmission of employers involves up to four different employers per year for both sons and fathers. At age 33 it represents the life time incidence of the intergenerational transmission of employers showing whether the son at any point since the age of 16 had the same employer as his father back to the year they were 15. See Corak and Piraino (2011) for a more detailed discussion and analysis.

father's employers than actually have, using the term loosely, a "career" job with the employer that gave their fathers a career job. This lends credence to our discussion of the role of the job search process and reservation wages by suggesting that the possibility of same firm employment across the generations is greater than what is observed by focusing on the main employer in adulthood.

The incidence of same main employer across the generations is positively associated with father's earnings. Figure 1 presents the proportion of sons in each percentile of the father's earnings distribution having the same main employer. For percentiles below about the 45th the incidence is, for the most part, below the overall average of 5.9%, while for percentiles above about the 55th it is above. Its highest values are among the top 3 percentiles, displaying a distinct jump to about 10% at the 98th and 99th percentiles and then to almost 16% at the top percentile.[10]

Table 2 offers the quartile transition matrix between father and son earnings, as well as the proportion of sons with the same main employer as the father in each cell. Many of the cells in the middle part of the transition matrix are not too different from 0.25, but the probability that sons born to fathers in the bottom quartile becoming bottom quartile adults is over one-third, as is the probability of sons born to top quartile fathers becoming top quartile adults. What distinguishes these two points is the fact that the proportion observed to have the same employer as their fathers is much higher among sons of top earning fathers. About 4% of sons of bottom quartile fathers have the same employer as their father regardless of whether they remain at the bottom of their earnings

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[10] The positive relationship depicted in Figure 1 is relatively robust to the definition of same-firm-employment. Corak and Piraino (2011) document a slightly different pattern when the focus is on the broader measure, ever holding a job with an employer that ever employed one's father. The incidence is U-shaped, generally falling when father's earnings are below the median and rising when they are above, with a sharp spike in the incidence among the sons of top percentile fathers.

distribution or move to the top. In contrast, only 3% of the sons of top earning fathers who fall to the bottom quartile have the same employer as their father; this proportion is close to 12% for those who remain in the top quartile. A similar pattern holds for those born to fathers in the third quartile, and to a lesser degree the second quartile. For the most part it is also the case that the upward movement of one quartile from the father's original position is associated with a higher percentage of same firm employment than that associated with sons who remain in the same quartile as their fathers. Similarly, downward mobility of one quartile is associated with a lower fraction of same firm employment than that associated with sons who remain in the same quartile.

It should be noted that the patterns described in Figure 1 and Table 2 are not unique to Canada. Bingley, Corak, and Westergård-Nielsen (2012) undertake a comparative analysis of the intergenerational transmission of employers using Canadian and Danish data. The incidence of same firm employment across the generations is similar though slightly lower in Denmark (about 30% for the life-time measure and 4% for the main-employer measure versus 40% and 6% in the Canadian case), but the positive relationship with parental earnings, the sharp spike at the very top of the earnings distribution, as well as the association with the elements of the earnings transition matrix are striking by their similarity. Indeed, the Danish equivalent of Figure 1 is virtually the same, with the data points lying slightly below the Canadian, and rising sharply above the 90th percentile, but particularly above the 95th. The availability of detailed and comparable administrative data makes a comparison of these two countries possible and at the same time limits the ability to make comparisons to countries more similar to

Canada.[11] But the fact that these two countries differ significantly in their geography, industrial structure, and labour markets suggests that the patterns our analysis focuses upon, particularly the non-linearity at high incomes, are not Canada-specific.

The major limitation of our data is associated with the co-variates available for analytical purposes. We are restricted to making use of information relevant for and collected as a part of the filing of income tax returns. Educational attainment and occupation are not, for example, available to us, to say nothing of information from questions intended to measure time preference or risk aversion. However, we follow Mayer (1997) in suggesting that markers of other traits that may be important endowments passed on between fathers and sons can be obtained by using indicators for the presence of different types of incomes. Our analysis is focused on earnings, but all sources of total income are also available in the data. Mayer (1997) argues, for example, that the presence of asset income—as distinct from the actual amount—can be taken as an indicator of unobserved parental traits, like time preference or motivation that will influence the long run outcomes of children. In addition, Hill and Duncan (1987) and Corak and Heisz (1998) also examine the association between child outcomes and so-called "first dollar" effects of different types of income. We borrow from these analyses and introduce indicators of whether the father reported any self-employment income, any investment income, and any capital gains over a five year period during the son's teen years. These indicators are intended to capture, in some degree, the potential transmission

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[11] Altonji and Dunn (1991, pages 293-98) use a number of cohorts from the US based National Longitudinal Surveys and show that there is a large, positive, and significant relationship between father and son industry wage premia, and also that collective bargaining status is correlated across the generations. They suggest that family connections in the rationing of jobs would permit fathers in industries paying rents to get their sons jobs in high wage firms. But they have no direct evidence at the firm level.

of endowments associated with entrepreneurship, time preference, and risk aversion. In

the following section we also document that they vary positively with paternal earnings.

While using this information falls short of a clear identification strategy, it is a step in the

direction of recognizing that parental networks associated with employers may not be the

only endowment to play a role in the child's earnings outcome.

4. The Empirical Model

Our objective is to estimate the intergenerational earnings elasticity by recognizing that

the population of sons consists of a mixture of two groups, those who draw on parental

job contacts and those who do not. The empirical strategy is to split the sample of

families by the likelihood of having intergenerational employer contacts, and to assume

separate linear models of earnings transmission for the two groups. Our theoretical

discussion offers the logic behind this approach, namely that the group more likely to

have parental networks should experience more intergenerational earnings persistence

under the assumption of perfect capital markets. These families are identified by

exploiting the information available in our dataset.

Consider again the standard intergenerational earnings relationship, $ln\ Y_t = \alpha + \beta ln Y_{t-1} + \varepsilon_t$, but expressed as two distinct regression regimes: the first applying to

individuals without intergenerational job contacts (say $I = 0$); the second to those with

contacts (with $I = 1$).

$$\ln Y_t^0 = \alpha_0 + \beta_0 \ln Y_{t-1}^0 + \varepsilon_0 \qquad \text{if } I = 0 \qquad (6)$$
$$\ln Y_t^1 = \alpha_1 + \beta_1 \ln Y_{t-1}^1 + \varepsilon_1 \qquad \text{if } I = 1 \qquad (7)$$

We can think of the system described by equations (6) and (7) as a switching regression

model. Three types of switching regressions can be distinguished depending upon the

information available for the indicator I. If I is observed with certainty, the model is characterized with a known sample separation and the two equations can be estimated separately. If I is unobserved, the switching regression model has unknown sample separation, with each observation having an unknown probability $p \equiv \Pr(I = 1)$ of belonging to regime 1, and probability $1 - p$ of belonging to regime 0. The econometric challenge, in this case, is to estimate the parameters β_1 and β_0 without knowing *a priori* which of the n values of the dependent variable was generated by which regime (Quandt, 1972). When some information on I is available but this information is only partial, the model is one of imperfect sample separation. In this case, the "true" regime is unobservable, but there exists a proxy measure, Z, which identifies the regimes with error.

We focus on this latter case in order to recognize the degree of uncertainty with which our indicator of intergenerational transmission of employers discriminates the sample observations across the underlying regimes. In other words, the subsamples of individuals working and not working for a past employer of their father (respectively with $Z = 1$ and $Z = 0$), will in effect be made up of mixed groups, with observations from both regimes ($I = 0$ and $I = 1$). This is the scenario studied in Lee and Porter (1984), who show that any misclassification will result in biased estimates of the β coefficients if the sample separation is treated as known.

We follow Lee and Porter (1984) as developed in Maddala (1986, pp.1646-8) and Guo (2009) to derive the likelihood function for the system of equations (6) and (7). Assuming that the error terms in the two regression regimes ε_1 and ε_0 are independently

and normally distributed with mean zero and constant (though not necessarily equal) variances, we can express the probability density function for Y_t in regime $I = 0, 1$ as

$$f_{i,I} = \frac{1}{(2\pi)^{1/2}\sigma_I} \exp\left[-\frac{1}{2\sigma_I}(Y_{i,t}^I - \beta Y_{i,t-1}^I)^2\right] \quad \text{for } I = 0,1$$

from which the joint density of Y_t and Z can be derived

$$f(Y_t \mid Z) = \left[f_1 p_1 + f_0(1 - p_1)\right]^Z \left[f_1(1 - p_0) + f_0 p_0\right]^{1-Z} \tag{8}$$

where $p_1 = \Pr(I = 1 \mid Z = 1)$ and $p_0 = \Pr(I = 0 \mid Z = 0)$. Thus, the distribution of earnings is a mixture of two normal distributions, and is estimated by maximum likelihood under this assumption.

The parameters in the likelihood function can be estimated when *a priori* information to distinguish between the two regimes is available (Lee and Porter 1984, Guo 2009). In our case, we assume that those who work for the same employer as their father are more likely to be in the intergenerational job contact regime. That is, we assume that $\Pr(I = 1 \mid Z = 1) > \Pr(I = 1 \mid Z = 0)$, and that $\Pr(I = 0 \mid Z = 0) > \Pr(I = 0 \mid Z = 1)$ which implies that $p_1 + p_0 > 1$.[12] In our application the functional form of p_1 and p_0 is parametrized as a probit function: $\Phi(\gamma_0 + \gamma_1 Z)$. To this function we also add indicators for other endowments that may distinguish the regimes.

5. Estimates of the intergenerational elasticity of earnings

To fix ideas Table 3 offers results from least squares estimation under the assumptions of no sample separation, and of exogenous and known sample separation. Least squares leads to an estimated intergenerational elasticity of 0.250. This is at the upper end of the

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[12] Lee and Porter (1984) and Guo (2009) offer the proof.

range reported in the empirical literature for Canada using these data as well as Instrumental Variables estimators from survey data. This reflects our decision to focus on just the 33 year olds, the oldest cohort available to us.[13]

When we assume that sample separation is exogenous and known the intergenerational elasticity for those with the same employer as their father is estimated to be just above 0.4, higher than any results from a linear specification reported in the Canadian literature. Table 3 also reports similar results for four additional sub-samples: the lower 20% of the father's earnings distribution; the lower 95%; the upper 5%; and the upper 3%. These distinctions are motivated by the patterns in Figure 1—that there is a distinct rise in the intergenerational transmission of employers at the very top of the distribution. These sub-divisions of the data are also in line with the non-parametric results in Corak and Heisz (1999) and Corak and Piraino (2011) that suggest a distinct non-linearity in the intergenerational earnings elasticity at the very top few percentiles of the father's earnings distribution. The results in panels 4 and 5 imply that for the top 5% and 3% of the father's earnings distribution the difference in the estimated elasticities across regimes is significantly larger, with the reported elasticities for those not having the same main employer lower than 0.2 and for those having the same employer above 0.5.[14]

We use the estimates reported in panel 1 of this table as starting values for the maximum likelihood estimation, the results of which are reported in Table 4. This table

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[13] When a cohort of 30 to 33 year olds is used we obtain an intergenerational elasticity of 0.224, which is more in line with other research (Corak and Heisz 1999, Fortin and Lefebvre 1998). Corak (2006) and d'Addio (2007) report that as such Canada is among the relatively more mobile countries for which comparable estimates are available, in particular an intergenerational elasticity of a little over 0.2 is about half as great than commonly reported for the United States.

[14] For example, the differences between the two elasticities for the entire sample, as described in panel 2 is 0.178 with a standard error of 0.021; for the lower 95% in panel 4 it is 0.222 (with a standard error of 0.026); and for the top 5% it is 0.389 (with a standard error of 0.085).

offers results from models in which sample separation is known imperfectly (using the

same main employer indicator as the imperfect classifier of the regime). As explained,

the classification of regimes rests on the assumption that sons working for a former

employer of their father are more likely to be in the "employer contacts regime." This

proxy variable enters the likelihood expression in the probability function associated with

each regime, $\Phi(\gamma_0+\gamma_1 Z)$, so that the sign of the coefficient γ_1 on the same main employer

dummy identifies the regression regime corresponding to the presence of paternal

employer contacts. The only difference in the likelihood function between the unknown

and uncertain sample separation models is in the functional specification of the

probabilities associated with the regimes, thus we should not expect appreciably different

estimates of the intergenerational coefficients in the two models.[15] The contrast between

the estimates in panel 1 of Table 4 with those of panel 1 in Table 3 shows that the

employer contact regime is associated with the lower elasticity, and at 0.19 a magnitude

significantly lower than the 0.41 estimated under the assumption of known sample

separation.

In order to interpret the two-regime switching regression results in Table 4, we

must specify how β varies in the population in light of our theoretical framework. The

augmented Becker-Tomes model shows that in the context of imperfect capital markets

the intergenerational earnings elasticity will be affected by both credit market distortions

and parental job contacts. The results in Table 4 provide evidence of the existence of

multiple regimes across the father's earnings distribution, possibly as a result of the

interaction between these two effects.

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[15] This is in fact the case, with the results being available upon request.

Therefore it is difficult to interpret these findings, except at the very top of the father's earnings distribution where families are likely not to be credit constrained. In this sense the switching regression model in panels 4 and 5 can more cleanly distinguish the two theoretical regimes with respect to parental employer contacts. Compared to lower segments of the earnings distribution, the magnitudes of the elasticities are reversed, with the employer contact regime having the higher elasticity. That is, the intergenerational transmission of employers increases the earnings elasticity as predicted by theory when credit markets are perfect. It is clear from the results in panel 5 that the preservation of relative earnings status across the generations for sons of top earning fathers is associated with the possibility of being employed at the father's firm. Without this endowment the elasticity is close to zero, and for those at the very top not even statistically different from zero (the p-value being 0.878). These sons are unlikely to stay in the top part of their earnings distribution: sons born to fathers at the very top are perfectly mobile—in this case perfectly downwardly mobile—if they cannot access their father's employer.

In the absence of exogenous variation in the inheritance of employers, the findings in tables 3 and 4 are susceptible to alternative interpretations. A general reading of the results would be that unobservable characteristics which cause sons of rich fathers to work for their father's employers are strongly associated with similar earnings outcomes as their fathers, while this seems not to be true for children of poorer parents. Moreover, it is hard to say what is going on at other parts of the distribution without clear controls for credit market constraints or other individual endowments.

To narrow down the scope for alternative interpretations, we replicate Table 4 with a multivariate specification of the probit equation, using indicators for the presence

of paternal income from self-employment, interest, and capital gains. We introduce these indicators to proxy specific aspects of the father's endowment: entrepreneurship, time preference, and risk aversion. Table 5 reports the coefficient estimates from the probit equations only, since the estimated elasticities are virtually identical across specifications. Panel A offers the results from a series of univariate, separately run models, in which these indicators are used on their own as regime identifiers. The first column in this panel repeats, for reference, the corresponding results for the same main firm identifier from Table 4. Panel B offers the results from multivariate specifications for each of the five samples, while Panel C presents descriptive information on sample proportions.

Focusing on the information in panel B and contrasting it with the information in Panel A and Table 4 illustrates four major results. First, for the population as a whole, in which the employer contact regime is associated with a lower intergenerational elasticity, including indicators for investment income and capital gains income that are meant to signal both the presence of a financial budget constraint but also personal characteristics like time preference and risk aversion, helps inform the labelling of the regime but does not change the estimate of the intergenerational transmission of employers. It would appear that there in fact are a host of endowments that parents pass on to children, but that these work together to increase mobility for the broad majority of the population. The employer contacts regime might be thought of as an unconstrained regime, or a regime of the 'better' endowed. This regime is associated with a smaller intergenerational earnings elasticity because either credit constraints don't bind or the individuals have other endowments that are positive enough to overcome them.

Second, the role of paternal employer contacts in increasing the generational earnings elasticity is clearer when we contrast the results across points in the father's earnings distribution. For the lowest earnings group, panels 2 in tables 4 and 5. The indicator for same firm employment is not statistically significant, and therefore does not distinguish the regimes. The presence of interest income and capital gains play this role. The estimated intergenerational elasticity that is insignificantly different from zero in panel 2 of Table 4 is likely to reflect the circumstances of financially unconstrained sons from low income fathers, or sons that have been endowed with characteristics associated with these sources of income and are valued in the labour market. However, when a larger fraction of the population is brought into the analysis, as in panels 3, same firm employment distinguishes the two regimes, and the earnings elasticity associated with the possibility of inheriting an employer becomes positive and statistically significant. It is not necessarily higher than the elasticity in the other regime because of the continued role of financial constraints or lack of other endowments, but it is higher than the statistically insignificant finding for the bottom 20% of the population.[16]

Third, at the upper end of the distribution the population can reasonably be characterized as facing perfect capital markets. There is also less heterogeneity in other endowments. In Table 5, panel C, rows 4 and 5 illustrate that a significant minority have an entrepreneurial background (double that of the population as a whole), almost all have fathers reporting investment income, and the majority have fathers reporting capital gains (at least three times that for the population as a whole). For sons of top 5% fathers the

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[16] The fact that networked jobs are often found to have wage premia (particularly for men, as discussed in the survey by Ioannides and Loury, 2004) is also consistent with this pattern. At the bottom of the wage distribution, the network wage premium would run counter to the father's low paying job. As the father's wage increases, getting a job with a father's employer is likely to be a higher paying job, complementing the network wage premium.

intergenerational elasticity is higher in a regime that is distinguished by the presence of self-employment income leading to an elasticity of 0.48 compared to 0.08 in its absence. Entrepreneurship associated with a self-employed father matters as an attribute in and of itself, or as the determining factor in how employers are transmitted intergenerationally.

Fourth, and finally, the interaction of these two factors is clearer for sons of fathers in the top 3%, where Figure 1 documented a distinct spike in the transmission of employers. The transmission of employers becomes the dominant indicator of regime type, leading to an intergenerational elasticity of 0.59 in its presence and essentially zero in its absence. The preservation of earnings status among the sons born to fathers at the very top of the earnings distribution is associated with not only having a father who has some self-employment income, but also with the possibility to connect his son with a job in his employer. The presence of investment income or capital gains income plays no role in identifying the regime.

6. Conclusion

The main objective of this paper is to examine the implications of family connections in labour market status, in particular the capacity of sons to work for the same employer as their fathers, for explaining nonlinearities in the intergenerational transmission of earnings. We adapt the standard model of intergenerational earnings mobility so that earnings are determined by two types of endowments. In particular, we consider a model in which parental employer contacts imply that some children will be employed with the same firm as their parents, and suggest that this is an endowment that directly influences the child's earnings function. In the absence of credit market constraints or heterogeneity

in other endowments, the capacity to transmit an employer across generations raises the intergenerational earnings elasticity. Furthermore, it displays a non-linearity that leads to a higher intergenerational elasticity at the upper end of the parent's earnings distribution. This result follows from an assumption that the intergenerational transmission of employers is positively related to parental earnings.

The administrative data we use on a cohort of young Canadian men clearly shows this positive relationship, and is also distinguished by a sharp spike in the transmission of employers from fathers in the top few percentiles of the earnings distribution to their sons. On average close to 6% of these young adults obtain the majority of their earnings from an employer who was also the main employer of their fathers some 15 to 20 years earlier, but 16% of sons raised by fathers in the top percentile of the earnings distribution do so. Other studies show that these patterns are not unique to the Canadian case.

Our empirical analysis recognizes that some sons who are never observed to have been employed at a firm that once employed their fathers may still have their reservation wages influenced by the possibility that they could have such employment. Others who are observed to have had such employment could have found the employer on their own without relying on information or contacts from their parents. As such an assumption of known and exogenous sample separation is not appropriate: the observation of same firm employment across the generations is an imperfect indicator of regime type. Our maximum likelihood estimates account for this. We find higher intergenerational earnings elasticities for those in a position to inherit their father's employer when the possibility of credit market constraints and heterogeneity in other endowments are smallest. The empirical analysis also yields much higher estimates of the

intergenerational earnings elasticity for those at the upper tail of the father's earnings distribution. We suggest that the preservation of intergenerational earnings status among top earners is influenced by the capacity of the sons to obtain employment with their father's employer.

Our analysis is related to a number of labour market concerns. In particular, by highlighting patterns in the intergenerational transmission of employers and earnings at the upper tail of the earnings distribution we raise further implications and issues for study in the literature that has documented the growing cross-sectional inequality in earnings due to increasing top shares. The findings also relate to long-standing attempts to understand inter-industry wage differentials. Further work could explore the conjecture Altonji and Dunn (1991) put forward, that alternative theories of wage structure can be assessed by recognizing the role of family connections in labour market status. In their view, the intergenerational transmission of employers and earnings we document would be consistent with non-market clearing explanations for inter-industry wage premia.

But the major implication of our work is to stress the need for a more flexible specification and interpretation of the standard linear regression to the mean model of intergenerational earnings transmission. We suggest that as the intergenerational earnings literature continues to address issues of causality it should also recognize that parents might invest in the success of their children throughout the course of their life cycle, not just in the early years. The structure of labour markets and the way in which young adults make the transition to their career job may also be an important part of the intergenerational dynamic determining their long-run attainments, an aspect that may be

just as closely tied to issues of equality of opportunity as private and public investments

in the early years are often portrayed as being.

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Figure 1
Proportion of sons with the same main employer as their father for each percentile of the father's earning distribution: father's main employer when son was 15 to 19 years compared to sons main employer between 30 and 33 years of age
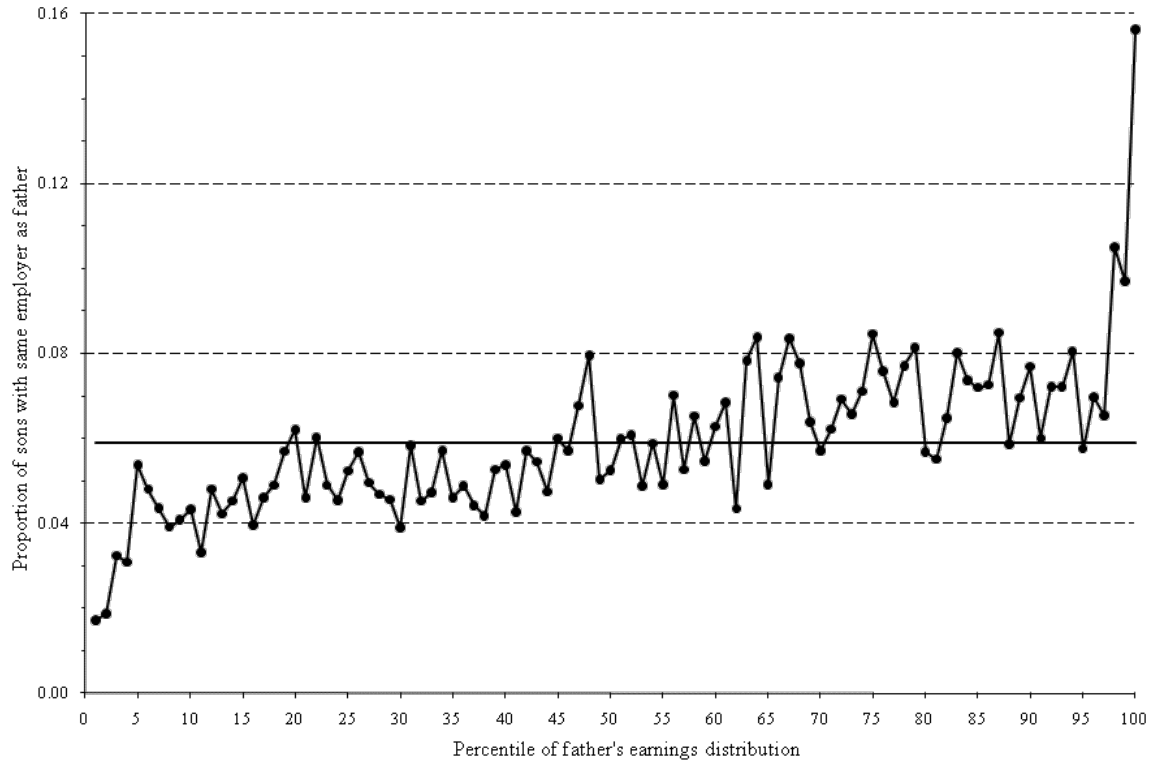
Note: The horizontal solid line is drawn at 0.059, the incidence of same firm employment for the entire sample. Calculations are based on weighted observations of 71,215 sons who are 33 years of age. Father's earnings percentiles are calculated using a five-year average of earnings during the period sons were 15 to 19 years of age.

Source: Calculations by authors using Statistics Canada administrative data as described in the text and the appendix.

Table 1
Descriptive statistics for fathers and sons linked intergenerationally

	Number of observations	Average Age		Average Earnings		Number of unique employers	
		Fathers (1980)	Sons (1996)	Fathers	Sons	Fathers	Sons
1 Entire sample	71,215	47.4 (6.14)	33	43,524 (27,085)	36,129 (22,953)	23,963	31,674
2. 95th percentile and below of father's earnings distribution	67,499	47.3 (6.18)	33	39,724 (15,377)	35,434 (20,904)	23,070	30,378
3. 96th percentile and above of father's earnings distribution	3,716	47.6 (5.22)	33	115,735 (68,499)	49,347 (45,281)	2,018	2,643

Note: Panel 1 refers to all inter-generationally linked sons born in 1963, and who are hence 33 years of age in 1996. Fathers' earnings are averaged over the five years the son was 15 to 19 years of age, and sons' earnings are averaged between 1994 and 1996. All monetary figures are expressed as constant 1992 dollars. The cut-off dollar value of the 95th percentile of the father's earnings distribution is equal to $79,910. The number of unique employers refers only to the main employer, the employer that paid the largest proportion of total earnings during the above periods. Figures in parentheses are standard deviations.

Table 2
Quartile earnings transition matrix with proportions of intergenerational transmission of employers within each cell

A. Father-son earnings quartile transition matrix

	Sons			
Fathers	Bottom	2nd	3rd	Top
Bottom	0.351	0.282	0.207	0.161
2nd	0.267	0.277	0.254	0.202
3rd	0.215	0.238	0.277	0.271
Top	0.168	0.203	0.262	0.367

B. Proportion of sons with the same main employer as father within each cell of the earnings quartile

	Sons			
Fathers	Bottom	2nd	3rd	Top
Bottom	0.041	0.048	0.038	0.042
2nd	0.027	0.059	0.067	0.061
3rd	0.022	0.046	0.083	0.101
Top	0.029	0.044	0.079	0.116

Table 3
Least squares estimates of a linear regression to the mean model of intergenerational earnings mobility: no sample separation, and sample separation exogenous and known

	Least squares estimates		
	Constant	Coefficient	Sample Size
0. No sample separation	7.50	0.250	71,215
1. Sample separation exogenous and known			
No same main employer in adulthood	7.60	0.235	66,949
Had same main employer in adulthood	6.87	0.413	4,266
2. Lower 20% of father's earnings distribution			
No sample separation	8.55	0.146	12,674
Sample separation exogenous and known			
No same main employer in adulthood	8.57	0.140	12,132
Had same main employer in adulthood	7.67	0.353	542
3. Lower 95% of father's earnings distribution			
No sample separation	7.48	0.249	67,499
Sample separation exogenous and known			
No same main employer in adulthood	7.57	0.236	63,599
Had same main employer in adulthood	6.16	0.458	3,900
4. Upper 5% of father's earnings distribution			
No sample separation	9.17	0.248	3,716
Sample separation exogenous and known			
No same main employer in adulthood	9.82	0.144	3,350
Had same main employer in adulthood	10.66	0.533	366
5. Upper 3% of father's earnings distribution			
No sample separation	8.99	0.249	2,220
Sample separation exogenous and known			
No same main employer in adulthood	9.85	0.134	1,955
Had same main employer in adulthood	8.31	0.523	265

Note: Table entries are least squares coefficient estimates based upon a linear regression to the mean model with the natural logarithm of son's earnings averaged over three years (1994 to 1996) as the dependent variable, and the natural logarithm of the five year average of father's earnings during the years the son was 15 to 19 years of age. The model also controls for the age and age squared of the father. All sons are 33 years of age in 1996. All estimates are statistically significant at the 1% level.

Table 4

Maximum likelihood estimates of a switching regression to the mean model of intergenerational earnings mobility: imperfect sample separation, same main firm as proxy

	Constant	Coefficient	Sigma	- ln L	p
		Maximum likelihood estimates			
1. Entire sample					
Regime without parental employer contact	6.45	0.314	0.691	-55,378	0.409
Regime with parental employer contact	8.40	0.187	0.314		0.591
		$\gamma_1 = 0.7430$			
2. Lower 20% of father's earnings distribution					
Regime without parental employer contact	7.41	0.269	0.649	-10,871	
Regime with parental employer contact	10.1	-0.0110	0.350		
		$\gamma_1 = 0.0530$			
3. Lower 95% of father's earnings distribution					
Regime without parental employer contact	6.47	0.297	0.680	-52,058	0.405
Regime with parental employer contact	8.44	0.184	0.315		0.595
		$\gamma_1 = 0.8129$			
4. Upper 5% of father's earnings distribution					
Regime without parental employer contact	9.36	0.078	0.318	-3,200	0.591
Regime with parental employer contact	8.28	0.485	0.860		0.409
		$\gamma_1 = 0.2117$			
5. Upper 3% of father's earnings distribution					
Regime without parental employer contact	10.6	-0.00548	0.344	-2,024	
Regime with parental employer contact	6.21	0.589	0.904		
		$\gamma_1 = 0.4880$			

Note: Table entries are maximum likelihood estimates using a Berndt-Hall-Hall-Hausman algorithm, with starting values given by least squares as presented in Table 3. Standard errors are estimated using the Outer Product of the Gradient. Convergence was attained within 20 iterations. All coefficients are significant at the 5% level except those shaded. The estimate of γ_1 in panel 4 has a p-value of 0.106. The model also controls for the age and age squared of the father. All sons are 33 years of age in 1996. Sample sizes for panels 1 through 5 are respectively: 71,215, 67,499, 12,674, 3,716, and 2,220 .

The column labelled *p* refers to the probability associated with each regime, calculated as $\Phi(\gamma_0)*\Pr(Z=0)+\Phi(\gamma_0+\gamma_1 Z)*\Pr(Z=1)$.

Table 5

Estimates of alternative regime proxies from maximum likelihood estimates of a switching regression to the mean model of intergenerational earnings mobility

	Same Main Firm	Father Self-employed	Father had Investment Income	Father had Capital Gains
A. Separate univariate models				
1. Entire sample	0.743	0.0105	0.356	0.146
2. Lower 20% of father's earnings distribution	0.053	0.229	0.555	0.495
3. Lower 95% of father's earnings distribution	0.813	0.0447	0.375	0.200
4. Upper 5% of father's earnings distribution	0.212	0.276	-0.0436	0.0422
5. Upper 3% of father's earnings distribution	0.488	0.283	0.218	0.0652
B. Single multivariate models				
1. Entire sample	0.728	-0.0365	0.338	0.0832
2. Lower 20% of father's earnings distribution	-0.0610	0.0816	0.495	0.321
3. Lower 95% of father's earnings distribution	0.798	-0.00567	0.350	0.128
4. Upper 5% of father's earnings distribution	0.200	0.278	-0.0839	-0.00956
5. Upper 3% of father's earnings distribution	0.485	0.279	0.193	0.00714
C. Sample proportions				
1. Entire sample	5.87	17.0	80.7	15.5
2. Lower 20% of father's earnings distribution	4.03	25.1	68.5	10.8
3. Lower 95% of father's earnings distribution	5.65	16.4	79.9	13.8
4. Upper 5% of father's earnings distribution	9.88	28.8	96.1	47.7
5. Upper 3% of father's earnings distribution	11.9	33.4	97.0	54.2

Note: Table entries are probit estimates from the maximum likelihood estimation of a switching regression model with imperfect sample separation. The maximum likelihood estimation uses a Berndt-Hall-Hall-Hausman algorithm, with starting values given by least squares as presented in Table 3. Standard errors are estimated using the Outer Product of the Gradient. Convergence was attained within 20 iterations. Only the coefficients on variables in the probit specification of the regime identifier are reported. All coefficients are significant at the 5% level except those shaded. Sample specifications and sizes are the same as those reported in the respective panels of Table 4.

Panel A refers to the estimates from a series of univariate probit specifications from a total of 20 separately estimated models. Panel B refers to the estimates from a series of multivariate probit specifications for each of five models.

Appendix on the construction of the data

These data are also used in Corak and Piraino (2011) to discuss the intergenerational transmission of employers, and this appendix draws from their exposition. Canadians file their income tax returns (so-called T1 Forms) on an individual basis, and Statistics Canada has grouped these into families using a variety of matching strategies that are described in Harris and Lucaciu (1994). The resulting T1 Family File (T1FF) is the basic building block for the creation of the IID, an intergenerational linked set of T1 Forms for a series of cohorts of young men and women, and their mothers and fathers. This represents not quite four million individuals and their parents, and in particular 1.9 million men who are the starting point for our research. We focus on the male cohort born between 1963 and 1966, and in fact for the most part the oldest subset born in 1963. These individuals are linked to their fathers—not necessarily their biological fathers—if they filed an income tax return between 1982 and 1986 while still living at home. This is required to ensure that a parent-child match is made, and also that the child has an observed Social Insurance Number (SIN), a unique individual identifier that can then be used to link all subsequent T1 Forms which contain information on earnings. These T1 Forms are available for all years between 1978 and 1996.

 The algorithm used to create the data leads to an under-representation of children from lower income backgrounds, and from the major metropolitan areas: Montreal, Toronto, and Vancouver. This reflects the fact that children who leave home early or who otherwise are not engaged in the labour market while at home are less likely to be linked to a parent. It also reflects the fact that new immigrants and their children will be under-represented in the data, the majority having a tendency to settle in the three major cities of the country. Weights based upon Census data have been created to account for this, and our analysis uses them throughout even though they make no difference to the results.

 The sample sizes associated with the creation of our analytical files are detailed in Appendix Table A1, which makes clear that they are large—measured in the tens and hundreds of thousands—given that the data potentially represent the universe of individuals in these age groups.

 Versions of these data have been used by Blanden (2005), Corak (2001), Corak, Gustafsson, and Österberg (2004), Corak and Heisz (1999), Grawe (2006, 2004), Oreopoulos (2003) and Oreopoulos, Page and Huff Stevens (2008) to study a host of issues dealing with intergenerational mobility. Our application is unique in that we further develop the data by adding information on the specific firms employing parents and children throughout the period they are observed. We do this by relying upon a longitudinally consistent catalogue of all enterprises in the country, linked to individuals through the earnings remittance forms issued to employees (the T4) and used to support their income tax returns. This database of firms is referred to as the Longitudinal Employment Analysis Program (LEAP). See Statistics Canada (1992, 1988) for a description of its construction and use. Each T4 has a payroll deduction account number unique to a firm, and the LEAP serves to aggregate the possibly many account numbers per firm into a single longitudinally consistent identifier. For each individual (fathers and sons), and for each year from 1978 to 1996 we obtain unique firm identifiers for up to four employers. Very few individuals ever have more than four different employers in

any given year. Using the individual's earnings from each employer we designate for a given year the firm accounting for the majority of total earnings as the "main" employer in that year, or sometimes over a five year horizon according to our analytical needs.

The LEAP offers an accurate representation of the private sector but our analysis of the intergenerational transfer of employers is hampered by the fact that it does not distinguish separate employers in the public sector. This refers to federal and provincial public services but not to municipal governments. For anything finer than a two digit industry analysis this will overstate the degree to which employers or industries are passed across the generations. In order to recognize this, we consider father-son matches in employment in the public service as missing information on same firm employment. Accordingly we note that the analysis offers conservative estimates of the degree of intergenerational job contacts.

Appendix Table A1
Sample sizes associated with the creation of the analytical files from the Intergenerational Income Data

	Sample size	Weighted sample size
Entire sample, all male cohorts	1,890,923	2,474,667
1963 to 1966 male cohorts	653,959	886,099
Fathers with positive earnings in each of five years when sons were 15 to 19 years of age	340,199	417,510
Sons with positive earnings in each of three years between 1994 and 1996	240,478	294,706
Bottom percentile fathers and bottom percentile sons deleted	236,490	288,964
Fathers born between 1908 and 1952	236,210	288,607
Only 1963 cohort, those 33 years of age in 1996	71,125	84,343