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# **Why Do Scientists Move (and Why Should We Care)?**

This policy brief provides an overview of new evidence on the determinants of mobility of scientists - high human capital workers who generate new ideas and expand the frontier of knowledge. New evidence from a large dataset of elite US life scientists shows that professional factors, including individual productivity and the quality of a scientist's peer environment, matter for mobility. Strikingly, family structure also plays a significant role, with the likelihood of moving decreasing when a scientist's children are in high school (14-17 years old). This suggests that even "star" scientists take into account more personal, family factors in their mobility decisions, likely due to the costs associated with disrupting their children's social networks.



Workers often face an important decision during their career: should I move to a new city for a new job? Relocation is a complex decision that can involve numerous professional and personal factors, and some of these factors can constrain moves while others facilitate them. Relocating can, on one hand, mean significant transition costs in terms of uprooting one's family and navigating a new city and workplace; on the other hand, it can open up new career opportunities and provide environments where one's skills are put to better use.

Why should we care about whether and why workers move? Economic theory suggests that mobility is one channel through which worker productivity can be increased by improving the employer-employee "match". Moreover, particularly for highly-skilled workers, theory suggests that the mobility of workers can impact the productivity of their peers; if the human capital of the mobile worker "spills over" to their peers, then the peers left behind would experience a decline in productivity and those at the new destination would get a boost.

In light of this, understanding the mobility of scientists – high human capital workers who are generating new ideas and expanding the frontier of knowledge – is of particular importance when considering the potential role that mobility can play in increasing productivity and innovation, which are central to models of economic growth.

## The determinants of mobility

While there is a growing literature trying to document how the mobility of scientists can impact their own productivity and the productivity of their peers (see e.g. Agrawal, McHale, & Oettl, 2014), a significant challenge is finding plausibly exogenous variation in both the timing and location choices of movers. In order to

fully understand the impacts of mobility, we first need to know more about the determinant of mobility: why and when in their careers scientists move.

Several studies have examined the determinants of mobility of scientists and inventors, but the literature has been hampered by lack of data that allow researchers to observe the relevant factors that may matter for mobility. These studies have tended to focus on professional factors for moves; especially how individual productivity measures, like a scientist's number of publications, citations and patents, predict moves. Importantly, there has been less attention in this literature on the constraints to mobility, including more personal factors, like the role of children and family, and the quality of one's peer environment.

The findings from these studies on the role of individual productivity for mobility is mixed with evidence pointing to a positive relationship (Zucker, Darby and Torero, 2002; Lenzi, 2009), and some evidence showing negative (Hoisl, 2007) and/or no effects (Crespi et al, 2007). One key professional factor that has remained underexplored in these studies is the quality of the peer environment, or how one's colleagues can influence the choice of moving.

Moreover, very few studies have been able to examine non-professional factors such as the role of family and children. There is some evidence on family factors and inventor mobility from Sweden, where detailed data is widely available but within country mobility is relatively low (Ejeremo and Ahlin, 2014). There is also some evidence from the sociology of science literature showing that children influence the scientific performance and mobility of scientists. Using data from the U.S. Census, Shauman and Xie (1996) find that children tend to constrain mobility; for women, children negatively impact mobility regardless of the age of the children, while for men, it is older, high school-age children that tend to constrain



mobility. However, given that the study uses Census data, individual productivity measures are limited, which are needed to compare the effects for similarly accomplished scientists.

## Evidence from elite life scientists in the US

In [Azoulay, Ganguli and Graff Zivin \(2016\)](#) we examine the determinants of mobility of elite life scientists in the U.S. and for the first time, provide evidence on both professional and personal determinants of mobility. We use a unique panel dataset we compiled from the career histories of 10,004 elite life scientists to understand why and when scientists make decisions to move to new locations. We are able to observe the transitions scientists make between institutions, and focus on moves that are at least 50 miles apart (based on distance between the zip codes of the institutions) to increase the likelihood that a transition leads the scientists to change their place of residence.

The dataset includes individual productivity measures of publication counts and the U.S. National Institutes of Health (NIH) funding data. We also measure the quality of the peer environment at the scientists' origin and destination locations using publication and funding counts of peers. We define peers as both collaborating and non-collaborating peers (those who are close in "idea space"), and those who are geographically close (less than 50 miles apart) and those who are distant (more than 50 miles apart). Finally, to examine the personal factors, for each scientist in our sample, we hand-collected information on their children, including each child's year of birth.

Through regression analysis, we find that individual productivity is a positive predictor of moves, which is consistent with several other

studies (Zucker, Darby and Torero, 2002; Coupé, Smeets & Warzynski, 2006; Lenzi, 2009; Ganguli, 2015). We also provide new evidence on additional professional factors that influence the propensity to move. For example, we find that obtaining recent NIH funding deters moves, perhaps as a result of transaction costs associated with transferring federally funded research between institutions. We also find that a scientists' peer environment is a significant predictor of mobility, as scientists are less likely to move when the quality of the peer environment near their home institution is high and more likely to move when the quality of the peer environment at distant institutions is high.

Figure 1. Age of Children and Mobility: Age of Oldest Child

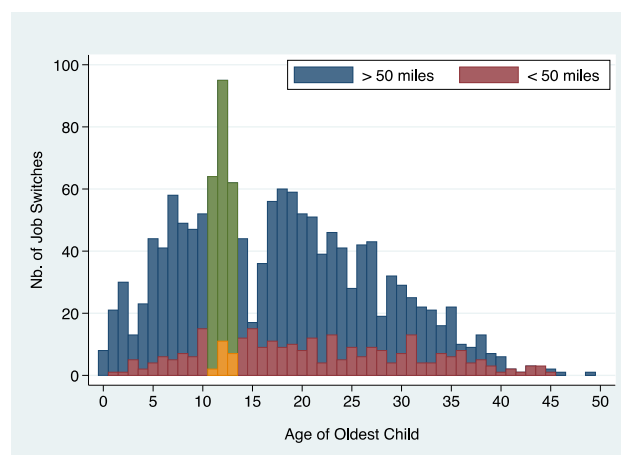
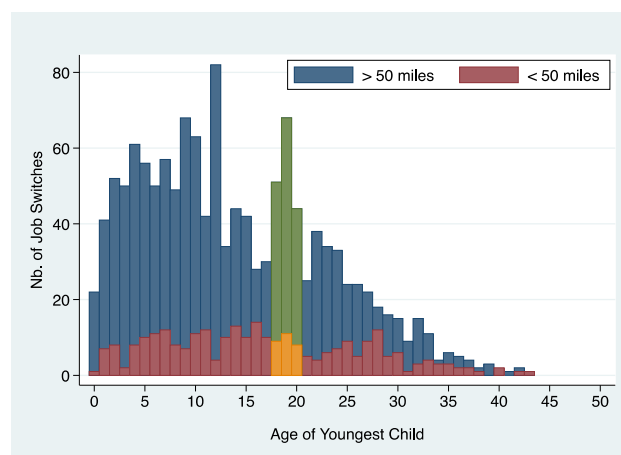


Figure 2. Age of Children and Mobility: Age of Youngest Child



Our most striking result is the role that family structure plays for mobility. We find a significant decrease in mobility when scientists' children are of high school age. The likelihood of moving increases just before their oldest child enters high school, and again when their youngest child is beyond high school age. Figure 1 shows a notable spike in distant moves just before the oldest child in the household enters high school (11-14 years old), while Figure 2 shows a similar spike after the youngest child completes high school (18-20 years old). In both figures, the relationship between age of children and local (less than 50 miles) moves does not show a similar spike. This relationship between mobility and age of children persists in regressions that allow us to control for productivity measures and potential confounders.

## Conclusion

This brief has discussed theory and evidence related to scientific mobility. New evidence from a large dataset of elite life scientists shows that while professional factors do matter for mobility, we also find that even "star" scientists take into account more personal, family factors in their mobility decisions, likely due to potential disruptions to the social networks of their children.

Given that there is still little evidence about what drives relocation decisions, it is important for further analysis of these issues, and our study raises several more questions for researchers to examine, many of which have important policy implications. For example, what is it about recent NIH grants that deter mobility - the terms of the grant contracts or costs of moving personnel and equipment? Regarding the family factors, we

were unable to look at differences among female and male scientists, but an important question for further research is whether the age of children and other factors appear to affect women's and men's relocation decisions differently.

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