The current state of higher education in sciences and engineering (S&E) in the US has recently become of concern. In particular, policy makers debate whether the system is adequate to sustain and improve the country's competitiveness in global innovation. Ensuring high graduation rates from S&E programs however is not sufficient to guarantee retention of high quality specialists in the profession. At the graduate and especially doctoral level attrition from S&E is a problem because graduate training is predominantly supported by the public funds and therefore is costly. Effective policies aimed at their retention require understanding the economics behind their career choices. This dissertation contributes to the literature on labor market behavior of S&E doctorates.

The first essay studies career mobility of white male doctorates in natural sciences and engineering using the Survey of Doctorate Recipients (1973-2001). It focuses on two issues. First, it assesses the relevance of doctoral careers to sciences and engineering (S&E) in general, and research and development in particular. Second, it evaluates participation rates and mobility patterns of doctorates in careers of different types. To analyze how various factors affect mobility, a transition model with competing risks is specified and estimated. The essay finds that only half of doctorates have careers in R&D, and another 8% work in occupations outside the scope of S&E. Employment choices vary throughout a career. Mobility both within- and out of S&E is especially high during the first 16 years on the job. The effects of individual and job characteristics, research productivity, and labor market conditions on transitions are also assessed.

The second essay extends the empirical framework described above and specifies a dynamic model of occupational choices with symmetric learning about one of task-specific abilities and dependence on past performance. The model is applied to the career choice problem of doctoral scientists and engineers to explain the following puzzle: Early in the career, majority of doctorates are employed in R&D and earn the lowest salaries relative to other tasks. However, as careers progress, they leave R&D for more applied tasks or completely change careers, while those who stay in R&D experience large earnings growth. This paper explains the puzzle with the presence of uncertainty about research ability, which can be learned by engaging in R&D. The model is estimated on the rarely used Survey of Doctoral Recipients (1973-2001): a longitudinal data set on employment histories and earnings of doctorates educated in the US. The parameters of the model are estimated using the Method of Simulated Moments. The predictions of the model are used to evaluate effects of two counterfactual experiments on the supply of the research skill. First, different learning schemes are compared to the case of full information. Second, the effects of R&D subsidies and changes in non-S&E employment options are assessed.

The third essay with Christopher Ferrall (Queen’s University) concerns geographic rather than occupational choices. In particular, it assesses the first jobs and their geographic location (USA vs. Canada) after receiving a doctorate degree from a U.S. university. The flow of people in
search of skill acquisition plays an important role in the post-training allocation of that skill. What determines the location of first jobs for the newly minted PhDs? Is the decision to stay in the U.S. related to the background of the student? How important is the relative economic situations of the U.S. and the home country? Do other policies or international situations matter? Answers to these questions determine which economies benefit from the human capital imparted by specialized training. The answers also influence whether governments that support direct cost of educating their citizens (or others) capture the benefits. We are using the Survey of Earned Doctorates 1957-2005, a census data on all PhDs awarded in the US, to evaluate the effects of personal characteristics and relative economic conditions on the propensity of choosing a job in the US vs. Canada. Besides controlling for demographic factors and differences in unemployment rates in two countries, we assess how decisions change during three specific periods: Vietnam War era, NAFTA, and post-911 years.