

# Candidate Statement

Timothy Schwieg

Hello, my name is Timothy Schwieg and I am a student at the University of Central Florida. I am currently earning my masters degree in a Business analytics program, and this is not what I imagined I would be doing at this point in my life. I went to a competitive high school and I did fairly well. I was accepted to Georgia Tech with some aid. However, It turned out to not be enough, and I found myself unable to pay for my out of state tuition there. Frustrated and angry I enrolled at UCF because it was close and I knew I could get help even if I was applying as extremely late as I was.

For a while I was too angry at my situation to be a good student, and I earned a few B's in classes I really shouldn't have. Worse yet, I was forming all the bad habits that come with apathy and resentment. However I was doing well enough that this wasn't really affecting me, and it wasn't until I decided to continue into graduate school that I realized what I had become. Sure I had the occasional B, or a few A-, but it wasn't really crushing my GPA. I had fallen into a slump where I accepted mediocrity. Like all slumps, it takes a while for you to realize its magnitude, and a shock to take you out of it.

The shock that woke me up took the form of Dr. Harry Paarsch teaching Econometrics. He had a whole routine to scare the poor business students, but at the core of it he was searching for the students willing to signal their ability to put their heads down and finish something they started. That push was exactly what I needed. He had assigned a term paper for the class, and I launched myself into it, working with a professor in the math department, and trying to build my own model of poker play. It didn't go very well in terms of predictive power, but that has never stopped any economist. I don't think the model I built was even close to something worth putting production. But it was never meant to be anything more than an exercise in creation.

Something changed working on that paper. I realized this was what I wanted to do. I knew I needed to know more so that I could begin applying serious models. That drove me to finally understand that graduate school was where I needed to go. While I had been teaching, and I enjoyed it, it was the feeling of putting together research that really connected with me. I found the purpose I had been missing at UCF before, and it galvanized my desire. I knew I had to do whatever I could to put myself in a position to be a good researcher. It wouldn't be enough to do well at UCF, I needed to be more.

After the semester had finished, I spoke with Dr. Paarsch about graduate school, and working on a paper to submit as a writing sample. He then did something no other professor at UCF had ever done. He didn't try to tell me I could go to mystical far-away places; he told me I would come short. He told me that I needed to take time learning how to be a serious student, how to push myself and keep myself disciplined. He was absolutely correct. So I enrolled in the economics/business analytics program and set myself up to fix these problems. I believe that in the last year I have succeeded in that. I have not only devoted myself to working hard, but also pushing myself to trying new problems.

The program I am in has lent itself to exploring these new problems, especially in computing. We have a lot of freedom in how deep we wish to explore them. Dr. Paarsch enjoys asking very open-ended questions such as: How much should you save for a house. This gives us a lot of choice on the complexity of the model we want to use, from a simple percent of income to a stochastic dynamic program. While most of my attempts at implementing models such as an LQ-control problem for savings weren't perfect, exploring the dynamics was an experience. In every open-ended problem I have explored and simulated the problem before trying to answer it.

I failed on some of them. Those problems were the ones I learned the most from. Breaking out of my comfort zone was more than just hard, but it has taught me exponentially more than keeping myself constrained. Maybe I broke a few more eggs than I made omelets, but I made more omelets than ever before. I want to continue to expose myself to new ideas and strategies, continue to push myself, and learn while preparing myself for a doctoral program. I know I'll fail, probably many times, but I also know I'm going to keep trying until I finally succeed.

A year ago I wasn't sure exactly what I wanted to do. However, the more time I've spent in economics, the more certain I've been that this is what I want to do with the rest of my life. I've prepared myself for the mathematical rigor I will face, and I am ready to take the plunge and prove to the world that I

can be at the top, and I deserve to be there. I've come from UCF, but I won't let that define what I've become.

I am primarily interested in Econometrics, specifically the structural approach. Much of my experience has been in auctions where a structural approach is very powerful. I believe that where the theory has been proven the structural approach is the best lens through which to interpret the data. Viewing a model through primitives that are then estimated is in my opinion, the best way to proceed. My main introduction to this material has been through *The Structural Econometrics of Auctions* by Paarsch. Throughout the first seven weeks in the Seminar in Economic Topics in my program we worked through many sections in the book, such as in what contexts can valuation distributions be identified.

One exception to the structural approach that I have found to be very interesting is many behavioral economic models. It can be difficult or impossible to fit some behavioral models. For example, I tried (and failed) to incorporate an auction model into a model of valuations (cumulative prospect theory) that required values be interpreted as relative to the price of the lottery. It did not go well, and a more reduced form approach was required. I am very interested in the approaches required to bring these two together, and see how the structure of the behavioral model might change the behavior suggested by the theory. I believe that the combination of these two will be where the best predictive power in economics will come.

During my undergraduate I focused on Probability and stochastic processes. The course I took titled *Topics in Applied Mathematics* was a course on financial mathematics, and the course Stochastic Processes continued on this trend. I have also completed some self-readings in analysis beyond the work I did for *Advanced Calculus*, completing material out of Rudin's *Principles of Mathematical Analysis*. I believe that this makes up for the fact that I only took a single semester of analysis officially at the university.

One area that I have worked in and found very interesting was numerical methods in dynamic programming. While I have not worked on very complicated dynamic programs, I worked on several assignments for Dr. Paarsch where I implemented dynamic programs numerically. I implemented both the Ramsey problem for a set consumption function and a variety of stochastic shocks affecting the production function in two manners: one in python using existing numpy libraries and vectorized code and in Julia where all the methods were implemented by myself. The techniques used were various forms of Gaussian quadrature for numerical integration, fitting a Chebyshev polynomial for the value function, and iteratively applying the contraction to find the equilibrium fixed point. Another model that I implemented was an explore-exploit model of a two-armed bandit that featured Bayesian updating to determine the optimal choice.

Much of the work I have done in this program has been focused on implementing commonly used techniques, such as frameworks for estimating and optimizing equations. Most of the focus of the work I have done has been in convex programming because of its ease of solving and global optimality from first-order conditions. I have worked also in integer programming and some more complicated nonlinear functions. However, the focus was not on those programs due to their inherent complexity and inability to solve at scale. I believe that I am quite qualified in numerical methods and computation, but would like to continue exploring their application to economic models.

During the course of this year, one aspect that has piqued my interest has been mechanism design. I believe that many of the strange behaviors that we observe today are the result of misaligned incentives and that mechanism design is the way we can control, or at least contextualize, these behaviors. My experience of it has been limited, primarily in auction theory and in the context of insurance models during information economics. I would certainly like to study it more and explore its results and limitations outside the scope of these well-understood models.

However, there is still a lot of economics I want to learn before I decide what it is I want to do. I would be perfectly content working in Econometrics, as I feel I would excel at it, but I would like to take classes in other branches as well before I decide what I do. This is why I would like to enroll in the masters to improve upon my knowledge of Micro and develop some experience in Macroeconomics.

I would like to continue graduate school after this program, and I believe that the Masters degree in econometrics is the best degree to do this from. I am prepared for a mathematically, and computationally rigorous program, and I believe I would excel in a program such as that. However I understand that I may not be prepared for a program as rigorous as this, and I may need to become more familiar with difficult programs. This is why I am also applying for the masters in Economics, which I understand is not an easy program, but I may find less strenuous than the masters in econometrics and mathematical economics. I believe I would be challenged in either program, and would rise to that challenge to succeed no matter where I am.