

Research Statement

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In this research statement I highlight my contributions to research. I have divided this statement into five sections. I talk about my research program in Section 1 and the impact and visibility of my research in Section 2. I reflect on my research program in Section 3. I discuss my future research agenda in Section 4 and conclude in Section 5.

1 Research Program

I am an empirical economist and almost all my research falls into three broad areas of economics:¹

1. Industrial Organization (L);
2. Economic Development, Technological Change and Growth (O); and
3. Labor and Demographic Economics (J).

The **unifying theme** behind most of my research is the **study of innovation, technological progress and growth**. I have explored various aspects of this theme at both micro and macro levels in a number of research projects. In the following I comment on each project separately. I describe the main idea of the project and my/our contribution to the relevant literature.

1.1 The Relationship between Market Structure and Innovation

This project was aimed at understanding how market structure (or degree of competition) affects innovation at the firm and industry levels. There is a huge empirical literature on this issue but the findings in the literature are mixed. Some studies find that more competition is conducive to innovation while some others find the opposite. Some recent studies suggest that the relationship is non-monotonic. When the level of competition in an industry increases, the firms may innovate more. However, when the competition becomes too intense, it may lead to less innovation. So the overall relationship between competition and innovation is inverted-U shaped.

In Hashmi [2013b] I make two contributions to this literature. First, I empirically show that the inter-industry relationship between competition and innovation may differ from country to country. For example, the prior research has shown that this relationship is inverted-U shaped in the UK manufacturing sector. I confirm this finding and further show, using the same empirical methodology, that the relationship is mildly negative in the US manufacturing sector. Second, I build a theoretical model to show that the relationship can take various shapes depending on the

¹Journal of Economic Literature (JEL) has developed an elaborate classification system for research in economics. I follow the JEL system to classify my research into the three broad areas. I report the JEL codes, which are well known to economists, in the parentheses.

technological distance among firms within an industry. By doing so I provide a unified theory that reconciles apparently conflicting empirical findings from the UK and the US manufacturing industries.

A recurring problem in the literature on the relationship between market structure and innovation is the endogeneity of market structure: we want to know how market structure affects innovation but in reality innovation also affects market structure and it is difficult to identify the direction of causality. One solution to this problem is to set up and estimate fully specified industry equilibrium models. However, due to the dynamic and strategic nature of the innovation decisions, such models are computationally very intensive.

In Hashmi and Van Biesebroeck [2014] we specify and estimate one such model for the global automobile industry. Our main contribution is to employ the state-of-the-art tools of structural econometrics to estimate a dynamic equilibrium model of the global automobile industry. In the model, the state of each firm is defined by the quality of its product. A firm can invest in research and development (R&D) to improve its quality but while doing so it needs to be mindful of the actions of its rivals. Moreover, the investment in R&D is a dynamic decision because its benefits spread over many years into the future. After estimating the structural model, we numerically compute the industry equilibrium. With the numerical equilibrium in hand, we can study the equilibrium innovation decisions of the firms for any possible state of the industry. This allows us to exogenously change the state of the industry and see how it affects the firms' innovation decisions. Our main findings are: (i) optimal innovation has an inverted-U relationship with a firm's own quality; (ii) holding own quality constant, innovation is declining in average rival quality, but increasing in quality dispersion; (iii) following entry, each incumbent's innovation declines, but aggregate innovation increases in most market structures. These findings are broadly consistent with the Schumpeterian hypothesis that market power leads to more innovation.

1.2 International Income Differences

Why some countries are so rich and some others so poor? Growth economists have devoted a lot of time and energy to answer this question. A common approach in this literature is to use the neo-classical growth model and decompose the observed income differences into those that can be explained by observed factors like physical capital or human capital and those that cannot be explained by the observed factors. The unobserved factors are often lumped together under the title of 'total factor productivity'. If more of the income differences can be explained by the observed factors, then a small increase in productivity will have a large multiplier effect and that can be considered a good thing for poor countries. The existing literature generally focuses on two types of observable capital: physical and human. It has been known for some time that another type of capital called 'intangible capital' may also be important in explaining international income

differences. However, until recently the empirical estimates of intangible capital did not exist.

In Hashmi [2013a] I use one of the first credible estimates of investment in intangible capital in the US and ask the following question: If we add intangible capital to a neo-classical growth model that already features physical and human capital, how much more of the observed international income differences will such a model be able to explain? I then show that the extended model can explain more than twice the international income differences compared to the model that does not feature intangible capital. The main contribution of the paper is to quantify the effect of intangible capital on international income differences.

I presented an earlier version of this paper at a workshop in New Zealand. My audience included Nobel laureate Robert Lucas. After the presentation, professor Lucas approached me and congratulated me on my presentation. A few days later he sent me an email to ask for a copy of the paper. I have reproduced a scanned image of that email in Figure 1. It was a great honor for me that professor Lucas liked my presentation and wanted to read my paper.

Aamir Rafique Hashmi

From: Robert Lucas <relucas@uchicago.edu>
Sent: Tuesday, 8 April, 2008 4:59 AM
To: Aamir Rafique Hashmi
Subject: Paper

Follow Up Flag: Follow up
Flag Status: Completed

Dear Aamir,

I liked your SWIM presentation a lot, but I neglected to pack a copy of your paper. Can you send me an electronic version? Thanks in advance.

Bob

Department of Economics
University of Chicago
1126 East 59th Street
Chicago, IL 60637

773-702-8179

Figure 1: Email from Professor Robert Lucas

1.3 Firm Strategy

Some of my research on market structure and innovation, especially Hashmi and Van Biesebroeck [2014], overlaps with the recent literature on firm strategy. This overlap kindled my interest in other questions related to firm strategy. In Hashmi and Xiao [2015a] we specify and estimate a dynamic game to understand the entry and expansion of KFC and McDonald's in 246 Chinese

cities from 1990 to 2007. Our main research question is how the rival's presence affects a chain's entry and expansion decisions. The structural estimates and numerical value functions enable us to quantify the spillovers from the rival and provide further insights into the entry and expansion behavior of the chains. We find that the rival's presence in the market has a positive spillover effect on the cost of entry or expansion. However, it also negatively affects the per outlet profit. The net effect differs across the two chains. We find that each additional McDonald's outlet in the city adds about ¥4.4 million to KFC's value whereas an additional KFC outlet subtracts about ¥4.5 million from McDonald's value. This paper contributes to the nascent literature on dynamic entry games and furthers our understanding of the spillovers from rivals in a strategic environment.

Another important aspect of a firm's strategy is its vertical relationship with upstream or downstream firms. One particular vertical relationship that has received considerable attention from researchers in the fields of Empirical Industrial Organization and Strategy over the last two decades is the interaction between manufacturers and retailers. More recently, researchers have explored the nature of bargaining between manufacturers and retailers.

In Hashmi and Xiao [2015b], we contribute to this literature by proposing a simple structural model to recover the implied relative bargaining powers of manufacturers and retailers from data on matches. The underlying idea is that a manufacturer-retailer pair will match, i.e. do business with each other, only if doing so is beneficial to both. Because the bargaining power of a party is proportional to its share of total payoff, data on matches and non-matches between manufacturers and retailers can be used to recover their implicit bargaining powers. We apply our idea to a unique dataset on rural mobile phone markets in four administrative regions of China. The dataset features both matches and non-matches between different manufacturer-retailer pairs. This feature of the data allows us to apply our method to estimate the match-specific relative bargaining powers of the manufacturers and retailers. After estimating the bargaining powers we look into their possible determinants and find that a manufacturer has a higher match-specific bargaining power if it is: active in more markets; offers more variety; a large firm by total revenue; and an international or listed firm. Manufacturers also enjoy higher bargaining power in the markets in which the consumers have higher incomes.

Choosing the right pricing scheme is at the heart of a firm's pricing strategy. Recently, many telecom service providers have adopted complex non-linear pricing schemes that combine three-part tariffs with the bundling of various services. For example, it is common for telecom service providers to offer voice, data and short-message services as a bundle and charge the consumers a three part tariff: 1) a fixed access fee; 2) a free usage allowance for each service; and 3) a marginal price for each service when the usage exceeds the free allowance. Are these complex pricing schemes optimal from a firm's point of view? What are their welfare implications, especially for the consumers? Given the complexity of the three-part tariffs under service bundling, it is difficult

to answer these questions theoretically even under very stylized assumptions.

In Hashmi et al. [2015], we plan to answer these questions empirically. We have obtained data from a Chinese provider of 4G wireless services. The dataset contains information on a randomly-selected sample of 20,000 consumers and covers a nine-month period from July 2014 to March 2015. It includes information on the consumers' plan choice and their daily usage of voice and data services. The company offers a menu of service plans which bundle voice and 4G mobile data services under three-part tariff pricing. We have developed a structural demand model to explain the consumers' service plan choices and their decisions about the usage of the bundled services. The model explicitly allows for continuous demand for each service and substitutability (or complementarity) in preferences between the services. We are currently in the process of writing codes for our estimation algorithms. The objective of estimation is to recover the consumers' preference parameters. The estimation results will enable us to carry out policy simulations to help find the optimal service plans conditional on the identified preference structure and the nature of substitution between the services. They will also shed light on the welfare implications of this pricing scheme. We hope to contribute to the empirical literature on consumer choice by shedding light on consumer behavior under bundling and three-part tariffs. We also hope to contribute to the pricing literature and provide some fresh insights into the costs and benefits of complex pricing schemes from both firms' and consumers' points of view.

1.4 Demography

In recent times low fertility has emerged as a serious constraint on economic growth in many developed countries. Singapore is one of the countries that have seen very steep declines in their fertility rates. The total fertility rate in Singapore has dropped from 4.7 children per woman in 1965 to 1.2 in 2011. This is well below the replacement level of 2.1 children per woman and one of the lowest in the world. Singapore is also known for relying more on labor and capital, and less on productivity, for its economic growth. A declining fertility, coupled with social problems associated with high immigration, has led to a slow down in Singapore's economic growth in recent decades.

In Hui and Hashmi [2007] we try to understand the implications of low fertility for Singapore's labor market and consider various policy options. We project labor demand and supply for Singapore for a 50-year period from 1999 to 2049. We show that the projected resident labor force will not be able to keep pace with the increased labour demand and the share of foreigners in the labour force will increase significantly even under the most favorable fertility scenarios. Assuming that immigration cannot increase without bound, we evaluate the labor market implications of three sets of policies: 1) Policies to increase labour productivity; 2) Policies to increase fertility rate; and 3) Policies to increase labour force participation of older workers.

I had completed the above paper (Hui and Hashmi [2007]) before finishing my doctoral studies in 2007. My interest in the economics of low fertility continued after my PhD. In 2010 I conducted a postal survey in Singapore to understand the economic determinants of fertility.² The sample consisted of 1600 randomly chosen married women aged 40 or above. The original idea was to estimate a structural model of individual fertility decisions. However, the survey response rate was disappointingly low and only around 100 women replied to the survey. After cleaning the data, we were left with 86 usable observations. In Hashmi [2011] I describe the survey methodology and present a summary of the survey results. In Hashmi and Mok [2013] we use the survey data to understand the determinants of low fertility in Singapore. We identify three key determinants of fertility in Singapore: 1) age at marriage; 2) household income; and 3) number of siblings' children. We find that fertility is negatively related to age at marriage and positively to the number of siblings' children. The relationship between fertility and household income is U-shaped: the relationship is negative for household incomes of up to S\$21,000 (in 2010 Singapore dollars) and positive for higher incomes. The main contribution of the study is to provide insights on the fertility decisions directly from the people who made them. Although the survey was not a great success, we learnt a great deal from the survey and the research offered a number of insights into Singapore's fertility problem.

1.5 Financial Economics (Pre-Doctoral Research)

During my masters at the National University of Singapore (1999-2001) I wrote a thesis entitled 'Autoregressive Conditional Skewness.' The thesis later developed into a joint research project with my thesis supervisor Anthony Tay. The main idea of the project was to extend the existing work on international spillovers in stock market returns to incorporate time-varying conditional skewness. In Hashmi and Tay [2007] we examine the influence of global and regional factors on the conditional distribution of stock returns for six Asian markets, namely Hong Kong, Korea, Malaysia, Singapore, Taiwan and Thailand, using weekly data from the 1990s. We estimate factor models that allow for conditional heteroskedasticity and time-varying conditional skewness, and use them to measure mean, variance, and skewness spillovers. We find that incorporating the time-varying conditional skewness improves the fit of our spillover models, and can alter measurements of variance spillovers.

Based on the paper, we were later invited to write a chapter, Hashmi and Tay [2012], for the *Handbook of Volatility Models and their Applications*. The chapter used the same model as in Hashmi and Tay [2007] but focused on Singapore and Hong Kong stock markets.

²In Singapore, population census data are not available to researchers so I decided to collect my own data.

2 Research Impact and Visibility

The most commonly used measure of the impact of an individual's research is the number of citations that the individual's research works receive. In Table 1 (p. 12) I provide the number of citations to my research from Google Scholar. One can see a clear jump in the number of citations in 2010 and again in 2014. More specifically, Google Scholar count of citations to my research was 116 on August 13th 2014. It increased to 173 on October 10th 2015: a 49% increase in just ten months. Looking at Table 1 (p. 12) and the recent surge in Google Scholar citations to my work, it is reasonable to expect that my research will gain more international visibility (as measured by citations in published articles) in the near future.

Another measure of the research impact is the *quality* of citations. In Table 2 (p. 13) I list some of the better known journals that have cited my work. I also report the impact factor of these journals. The table shows that my work has been cited by some respectable journals in the field.

Another measure of the visibility of one's research is the invitations from reputed journals to referee the articles submitted for publication. In Table 3 (p. 14) I list the journals, together with their impact factors, that have invited me to serve as an *ad hoc* referee for them. As one can see from the list, some of these are very highly regarded journals in the fields of economics and business.

In today's digital world, there are quite a few repositories of research papers that provide rankings of researchers based on various criteria. In the field of economics, one of the largest repositories is maintained by the Federal Reserve Bank of St. Louis and it is called Research Papers in Economics (RePEc). According to the latest general ranking of economists based on RePEc data, I rank 13,156 out of a total of 45,225 economists included in the database. This international ranking puts me at the 29th percentile. I consider it to be a respectable rank given that it has only been 8 years since my PhD.

At a more general level, the Social Science Research Network (SSRN) is one of the largest research repositories in social sciences. According to the SSRN's latest ranking, based on the number of downloads of a researcher's papers, I rank 24,875 out of 290,856 researchers. This puts me at the 9th percentile in this group of researchers.

My research has also been recognized in the latest annual review of my performance at the National University of Singapore. Based on the research done in the last three years, my department and the Faculty have placed me among the top 20% researcher in the faculty (please see the certificate on p. 15).

3 Reflections on Research Program

In this section, I reflect on my research so far and in the next I talk about my future research agenda. I have divided this reflection into three subsections. Each subsection addresses a separate issue that I consider important about my research so far.

3.1 Number of Publications

My research output, as measured by the number of published articles, is not very high. The main reason for the low output is that most of my research involves estimation of structural models and these models take notoriously long to estimate. Michael P. Keane, a well known structural economist, once said: "Speaking for myself, it usually takes about two years to program up and estimate a structural model." (p. 56)³

I have experienced something similar in my research. For example, I have published two papers in the *Review of Economics and Statistics*, a top journal in economics. One paper involves estimation of a dynamic structural model while the other involves the estimation of reduced-form models based on some theory. The former took me more than three years to complete despite the fact that it was a joint paper. The later took me less than a year to complete though it was a sole-authored paper.

3.2 Independence in Research

In my research so far, I have shown a reasonable degree of independence by writing and publishing sole-authored papers as well as joint papers with my students and peers. Although I found it hard at the beginning to work independently, doing so has helped me a lot in my evolution towards a mature researcher. At the same time, I have done joint work with my professors and benefited a lot from their experience.

3.3 Research Focus

Apart from my pre-doctoral research in financial economics, the rest of my research has been, either directly or indirectly, motivated by the issues related to innovation, technological progress and growth. However, I now feel that the focus of my research has been too broad and I need to narrow it down in future. I have already started this process. In Section 4 below I discuss my future research agenda in some detail. I hope that improving the focus of my research will enhance its quality and increase the international visibility of my work.

³Keane, Michael P. 2010. "A Structural Perspective on the Experimentalist School." *Journal of Economic Perspectives*. 24(2), pp. 47-58.

4 Future Research Agenda

I am currently working on a proposal for a research project that aims to understand the **effects of technological progress on labor markets**. The project is motivated by the debate on the race between education and technology. It is also motivated by the perennial debate on the effects of automation on labor markets. Finally, it is motivated by the recent increase in income inequality and job market polarization.

My interest in this project was further enhanced when the Center for Development of Teaching and Learning at the National University of Singapore invited me to contribute an article to a special issue of its journal. In that opinion-cum-scholarly article (see Hashmi [2015]) I discuss various labor market scenarios that may unfold as a result of the rapid growth of the Massive Open Online Courses (MOOCs).

In the first phase of my proposed project I plan to look at the firm-level and industry-level data and identify the characteristics of the firms (and industries) that generate more jobs than others. I am also trying to get hold of individual-level data on earnings that can be matched to employers. The idea is to understand what type of individuals have been doing better in the job market. I hope that the first phase of the project will improve our understanding of the employment dynamics within and across industries. It will also help to shed light (subject to data availability) on employment dynamics within firms.

Once we understand the employment dynamics within the firms and industries, we can start thinking about policies that can help reduce the negative effects of technology on labor markets without compromising on the positive effects of technology on growth.

I am very excited about this project because it aims to address some very important economic problems currently facing our economies. I am also excited because it fits very well into my overall research interest in technology and growth. Finally, this project is focused enough that it will help me make a significant contribution in a specific area of economics.

5 Conclusion

I am fully committed to high-quality scholarly research. I have published in reputable and high-impact journals. Although it took me a few years before my research really took off, in the recent years my research has begun to show more visibility and impact. I am currently working on a number of interesting papers and hope that my future research will be even more impactful than my research so far. My career goal is to rise to the rank of a full professor by showing complete dedication to scholarly research.

References

- A. R. Hashmi. Report on Singapore Fertility Survey 2010. Available at: <http://ssrn.com/abstract=1834003>, 2011.
- A. R. Hashmi. Intangible Capital and International Income Differences. *Macroeconomic Dynamics*, 17(3):621–645, 2013a.
- A. R. Hashmi. Competition and Innovation: The Inverted-U Relationship Revisited. *Review of Economics and Statistics*, 95(5):1653–1668, 2013b.
- A. R. Hashmi. Rapid Growth of Massive Open Online Courses (MOOCs) and the Market for University Graduates. *Asian Journal of the Scholarship of Teaching and Learning*, 5(1):23–39, 2015.
- A. R. Hashmi and W. J. Mok. The Determinants of Low Fertility in Singapore: Evidence from a Household Survey. *Singapore Economic Review*, 58(4):1–26, 2013.
- A. R. Hashmi and A. Tay. Global and Regional Sources of Risk in Equity Markets: Evidence from Factor Models with Time-Varying Skewness. *Journal of International Money and Finance*, 26(3):430–453, 2007.
- A. R. Hashmi and A. Tay. Mean, Volatility and Skewness Spillovers in Equity Markets. In L. Bauwens, C. Hafner, and S. Laurent, editors, *Handbook of Volatility Models and Their Applications*. John Wiley & Sons, New Jersey, 2012.
- A. R. Hashmi and J. Van Biesebroeck. The Relationship between Market Structure and Innovation in Industry Equilibrium: A Case Study of the Global Automobile Industry. Forthcoming in the *Review of Economics and Statistics* (expected publication date March 2016), 2014.
- A. R. Hashmi and P. Xiao. Dynamic Spillovers from the Rival: Evidence from the Entry and Expansion of KFC and McDonald’s in the Chinese Cities. *Working Paper*, 2015a.
- A. R. Hashmi and P. Xiao. Measuring Bargaining Power from Manufacturer-Retailer Matching Decisions. *Working Paper*, 2015b.
- A. R. Hashmi, Y. Luo, and P. Xiao. An Empirical Model of Consumer Choice under Bundling and Three-Part Tariffs. *Work in progress*, 2015.
- W. T. Hui and A. R. Hashmi. Foreign Labor and Economic Growth: Policy Options for Singapore. *Singapore Economic Review*, 52(1):53–72, 2007.

Table 1: Google Scholar Citations

Year	Citations
2007	6
2008	2
2009	9
2010	23
2011	18
2012	23
2013	19
2014	34
Total Citations:	173 ¹
h-index:	8

¹Includes citations before 2007
and after 2014.

Table 2: The list of journals in which the articles citing my research have appeared

Sr. No.	Journal Title	Impact Factor
1.	B. E. Journal of Economic Analysis & Policy	0.43
2.	Canadian Journal of Administrative Sciences	0.55
3.	Economics Letters	0.46
4.	European Journal of Finance	0.51
5.	Frontiers in Human Neuroscience	2.90
6.	Industry & Innovation	1.12
7.	Journal of Banking and Finance	1.36
8.	Journal of Economic Perspectives	4.23
9.	Journal of Empirical Finance	0.94
10.	Journal of Evolutionary Economics	0.68
11.	Journal of Industrial Economics	0.69
12.	Management Science	2.52
13.	Maritime Economics and Logistics	1.04
14.	Operations Research	1.50
15.	Quantitative Marketing and Economics	1.10
16.	Technological Forecasting and Social Change	1.96

Table 3: The list of journals for which I have acted as an *ad hoc* referee

Sr. No.	Journal Title	Impact Factor
1.	Applied Economics	0.52
2.	B. E. Journal of Macroeconomics	0.29
3.	Canadian Journal of Economics	0.64
4.	China Economic Review	1.14
5.	Econometrica	3.50
6.	Economic Inquiry	1.03
7.	European Economic Review	1.36
8.	Journal of Industrial Economics	0.69
9.	Management Science	2.52
10.	Oxford Economic Papers	0.85
11.	RAND Journal of Economics	1.22
11.	Research Policy	2.60
12.	Review of Industrial Organization	0.47
13.	Singapore Economic Review	0.10

A FASS Top 20% Researcher



Faculty of Arts & Social Sciences

This certificate is given in recognition of

Dr Aamir Rafique Hashmi

for Excellence in Research in 2014

(FASS Top 20% Researchers)

A handwritten signature in black ink, which appears to read "Brenda Yeoh", is written over a horizontal line.

Professor Brenda Yeoh
Dean
Faculty of Arts and Social Sciences

6 April 2015

Date