

Research: Understanding the drivers and implications of the architecture of economic activities

The past few years have seen traditional boundaries of firms and sectors redrawn, sometimes with dramatic consequences. The transformation of financial services and the concomitant change in the business model of banks, as well as other financial intermediaries, for instance, was arguably one of the drivers of the 2007/8 financial crisis [R6, R7, I3, I11]. In an increasing number of sectors, from telecommunications and media to healthcare and advanced manufacturing, competition has shifted from the creation of new products to strategies aimed at shaping the nature and boundaries of the market itself. Even sectors that had long benefitted from stability are now undergoing change: in the automotive sector, for instance, value is shifting into mobility [A11, I15] and new groups of firms compete for the valuable role of “orchestrator” and “system integrator”. From 2016 on, the eight biggest firms in terms of market capitalization have been the likes of Google, Apple, AliBaba, and Facebook, which all use a series of platforms that sponsor their own business ecosystems [A12, SA2].

One might take a purely phenomenological approach in looking at these features and consider them the epitome of the “new digital reality”. But doing so would miss the point that these changes, which appear to have picked up speed over the past decade, are part of a broader transformation in terms of the patterns through which labour is organized between and within firms. The past few years have also demonstrated that firms are increasingly proactive in shaping the nature of the business environment around them. My research, both before and after tenure, has focused on an understanding of precisely these dynamics. My interest has been the study of “Industry Architectures”, a term I coined in 2006 with M. Augier and T. Knudsen [Q2] to denote the rules, roles, and relationships that pertain to the division of labour in a sector, which affect not only “who does what” but also “who takes what”. My research has looked both at the drivers of changes in these architectures and their competitive implications.

My pre-tenure contribution was mostly to draw on and extend evolutionary and institutional economics, explaining how capability differences and transaction costs interact to drive scope; how firms endogenously change their transactional environments; and how the division of labour between and within firms shapes capabilities, and as such their efficiency and profitability. My post-tenure contribution built on this work, providing greater emphasis on the role of heterogeneity within industries as it shapes competitive outcomes, and illustrating instances of both change and stability in Industry Architecture and the resulting patterns of value migration. I have extended this research by providing systematic evidence of firms choosing their boundaries in a shifting context, and I have provided a theoretical framework for understanding business ecosystems. I currently have empirical research under way that aims to illustrate competition between and within ecosystems. My contribution to the literature has been to provide theoretical (verbal, appreciative and modelling) and empirical (qualitative and quantitative) research aimed at explaining what drives firms to make choices in terms of their place in their sectors’ architecture, and track the competitive implications of these choices. I have also tried to link my academic work and my engagement in practice—strategy and policy, whether in publications or with executive engagement.

In this report, I provide an overview of my research, both on foundational issues and on applied areas, from my PhD onwards. I present the main themes my work has addressed, and then consider the application of research on policy and strategy, before briefly commenting on my involvement in practice, my external academic visibility, my teaching, and my internal contribution.

1. *How the structure of economic activities affects capabilities: an industry-wide perspective*

My first area of interest has been the endogenous process through which industry boundaries are drawn. My *AMJ* paper on mortgage banking [A2], for instance, asks a deceptively simple question: How do new (intermediate) markets emerge? In the realm of economic abstraction, markets are replaced by firms, but when markets fail, economic history suggests that most activities tend to be integrated into larger entities, with markets emerging along the way. This paper focuses on the process of sectoral vertical dis-integration, examining the sector that lies behind the financial crisis. I show how firms, motivated by a desire to leverage skills and focus on competencies, invested in changing the transactional environment and pushed for an increasingly dis-integrated mode of production. This paper suggests that transaction costs are not given, but rather are an endogenous feature of industry evolution. Agency is thus a key driver in the process of vertical dis-integration.

That said, even when markets do exist, how do firms make their choices? Early in my career, the dominant view was to look at transaction costs. Yet my empirical investigation of a large-scale database in mortgage banking (*SMJ* with L. Hitt [A3]) suggests that differences in productive capabilities overwhelm these choices and drive both firm-level and aggregate patterns of vertical specialization. In this paper, we demonstrate how heterogeneity in capabilities drives scope decisions, and we suggest why it motivates firms to alter the menu of transactional alternatives. My formal model in *OrgSci* [A7] takes the interaction of these features further, showing how transaction costs and capability differences interact to shape aggregate scope in a sector, and why we should expect to see firms both make and buy in equilibrium.

Yet, if capabilities and transaction costs drive scope, and if capabilities (and the desire to profit from them) can affect transaction costs in the long run, what about the reverse causal link? My paper with E. Cacciatori in *Org Studies* [R1] looks at how the division of labour can also shape firms' capabilities, and it explains why, in addition to endogenous pressures for industries to shift from integration to dis-integration, with the creation of new intermediate markets, we also observe the inverse trend to re-integration. Our paper considers how the division of labour in the construction sector led to the increasingly dysfunctional and overly segmented capability structures found in the UK. These structures were then entrenched by regulation and industry standards, making it harder to reform the value chain, showing that the division of labour shapes capabilities. We also identify the conditions that allowed innovating firms to change the industry structure, offering new capabilities that spanned the value chain; this illustrates the shift from integration to dis-integration.

My paper with S. Winter (*SMJ* [A4]) consolidates and expands this line of research by offering a comprehensive conceptual framework for the way capabilities and transaction costs co-evolve to shape the institutional structure of production. Furthermore, our framework shows how this institutional structure affects the trajectories of capability development in the sector and its transactional attributes.

2. *From the sector to the organization: division of labour and capabilities*

My early research focused on sectors in the foreground and firms in the background, and later work complements this analysis by looking at issues of divisionalization within organizations. The question here becomes, how does the architecture of economic activities (i.e., organization design) *within* firms affect firms' capabilities? My *ICC* paper [Q1] provides an overview of how the division of labour shapes capabilities within (and between) organizations, suggesting that organizations operate as systems of decomposition, with each constituent part attuned to a particular aspect of reality. This divisionalization, I argue, is inherently incomplete, and it can be engineered through organization design. This suggests that the division of labour within firms might change not only as a response to environmental change, but also as opportunities consistent with the existing divisionalization run out, and new ways of organizing become more attractive.

Delving more deeply into the relative merits and shortcomings of different ways of organizing, my modelling working paper with P. Puranam [W3] looks at one choice firms have. Should they set up boundaries and coordinate through rules, or should they coordinate through interaction and unstructured mechanisms? Our paper elucidates the relative merits and shortcomings of each approach, focusing on the role of environmental turbulence and learning speed as driving forces. We also consider the dynamics noted before and look at what point in a firm's lifecycle it is worth shifting from one set of coordinating mechanisms to another.

But how can we see any of these mechanisms that show the role of divisionalization in practice? And, given that any way of divisionalizing will create blinders, what allows organizations to adjust? In my *OrgSci* paper on the Aegean Crisis [A6], I focus on the way hierarchy allows organizations to overcome such inherent limitations imposed by the division of labour. Examining a case where a governmental hierarchy spectacularly failed to play its proper role, I observe how an organization on "autopilot", absent a hierarchy with the ability to reframe the problem, allowed each of its parts to focus only on one side of a situation, carried out exception management, and synthesized the (inescapably) partial responses that it received.

This work focuses either on organizations in an abstract way or on the divisionalization and rules within an organization, but a key choice firms can make is to decide how to interface with the outside world. The question here becomes, how can a firm reinvigorate itself by shaping its own (external and internal) boundaries? My *OrgSci* paper with S. Billinger [A5] considers a single organization (a textile firm facing a declining market) where excessive divisionalization had led to stagnant capabilities. We find that this vertically integrated firm opted to partly open up its vertical boundaries, becoming "vertically permeable". It did so to facilitate load-levelling, to take advantage of opportunities in intermediate product markets, and to enhance its own performance and capabilities. We document how such permeability led to external benchmarking and the use of competitive pressure to improve performance of previously sheltered units. We also show how the use of external components fostered the firm's ability to come up with innovative responses.

My research with D. Croson also fits in this category. Our early *AMR* [A1] paper considers how information can be used in the context of agency relationships, pointing to the potential adverse side-effects of (ab)using information available to measure performance. Our modelling paper on small numbers outsourcing [W2] (a dormant R&R in *JIE*) asks a straightforward question: how can an

organization benefit by carefully structuring a mechanism of supplier networks where surplus is shared with the suppliers as a means to obtain non-contractible outputs? Our answer is that competition between and within tiers of suppliers, along with disciplining mechanisms, ensures that most of the surplus is appropriated by the buyer. The model's contribution is to specify the optimal sharing strategies; it shows that under a wide range of assumptions, the optimal number of suppliers is between three and five for inputs where contracts are hard to specify *ex ante* – a figure that broadly concurs with what is seen in practice (e.g., Li & Fung, Apple, etc.). We also show why equity investment (by lowering the discount rate of the future) can improve the buyer's share.

3. *Industry Architectures and sectoral dynamics*

Shifting from the level of the firm to the level of the sector (albeit, with firms in the background), much of my research just before and after tenure has looked at broader dynamics. This work has focused increasingly on the rules, roles, and relationships that prescribe the templates through which labour is divided within sectors. These templates, dubbed Industry Architectures in my *ResPol* with T. Knudsen and M. Augier [Q2], drive “who does what”, which, as we argue, shapes “who takes what”. In this theoretical paper, we ask: how can firms benefit from shaping the nature of the sector around them? We suggest that firms that can create ecosystems with a substantial number of complementors in the adjoining parts of the value chain can benefit from the activities of their complementors by becoming the “bottleneck”, or critical element, of a sector. We thus offer a revised analysis of Teece's (1986) take on innovation and the role of complementary assets as a means to appropriate returns, and we show how firms can manage an innovation ecosystem through shaping its architecture.

My work with my PhD student J. Tae in *OrgSci* [A10] uses the principles we articulated in the *ResPol* paper to confront data from the computer sector, long considered the quintessential example of value migration. The story of value migration in computing (from the OEMs to makers of microchips and software) may be well known, but we provide a large-scale quantitative analysis of the entire computing ecosystem and ask: How do conditions *within* one segment of the value chain affect the ability of that part of the chain to appropriate a share of the total sectoral profits? Our paper offers the first empirical study to span these two separate but causally connected levels of analysis. We document how disproportionately powerful firms, which we call ‘kingpins’, helped turn their own segments into industry-wide ‘bottlenecks’. By strengthening their own particular part of the value chain (e.g., through dominating R&D and helping manage the way sector-wide technology standards develop), kingpins can create positive externalities that act on their direct competitors and attract a disproportionate share of value in a sector.

How can we take some of these findings and shape practice? My paper in *HBR* with JP MacDuffie [P2], partly drawing on the data above (and its counterpart for automobiles), provides a comparative assessment of the computer and automobile sectors where, at least until the mid-2000s, there was no value migration, despite marked increase in outsourcing and expectations of sectoral transformation. We explain why these two sectors differed and how automobile OEMs were able to continue controlling the sector. More to the point, drawing on our research, we provide a set of managerial prescriptions on how disruptive entrants or entrenched incumbents can approach the challenges of value migration.

My recent *SMJ* with JP MacDuffie and J Tae [A11] advances this agenda. Its ambition is to answer two related questions. First, why did the automobile sector belie expectations, in the 1990s, that it would follow the fate of the computing sector? And, second, how were automobile OEMs capable of maintaining the lion's share of the sector and determining its trajectory? Our archival and qualitative study found that, contrary to popular belief, industry change was promulgated not by ambitious entrants or diversifying suppliers but by incumbent OEMs, who sought to advocate a radically new IA. Ironically, OEMs' original vision was modelled on computers, despite the fact that industry transformation in that sector led to integrated OEMs losing power and the ascendancy of specialised suppliers such as Intel and Microsoft in microprocessors and software, respectively. Our paper documents the drivers of structural stability in the automotive sector, where certification of quality and differentiability in the eyes of final consumers remained firmly in the hands of the OEMs. We also probe the question of agency in terms of who drives change in Industry Architecture. Complementing this paper, my more recent forays into the automobile sector (e.g., in *LBSR* [I15]) provide another illustration of the current dilemmas of value migration in the sector, which has, over the past few years, shifted considerably to now encompass the broader mobility space, with automobile OEMs being challenged by new digital upstarts.

Changes in Industry Architecture can do more than cement (or challenge) the dominance of a particular set of firms. They also shape collective welfare, and nowhere is this more evident than in the financial services sector, where changes over the past two decades have caused a massive wealth redistribution – and, arguably, sowed the financial crisis. In my paper with Drexler and Saavedra at *JFP* [R6], we look at how firms in the sector changed the rules to their advantage and ultimately (and unsurprisingly) built a collective system of financial intermediation that, literally, “didn't add up”. From a strategic and organizational perspective, we consider why and how regulators did not perceive the changes in the sector, and we discuss the nature of the changes to the sector's architecture. I address a similar set of questions, albeit based on economic and business history, in my *Business History* [R7] paper. There, I chronicle the changes in the sector, suggesting they led to a predictable evolutionary disaster, and I explain why this (changing) architecture of the sector, and its potentially deleterious impact, was not taken seriously at the time (and, arguably, is still not taken as seriously as it should be).

We might ignore changes in Industry Architecture at our own risk, but what forces are not only pushing for change but also pushing for stability? My recent paper with JR Saavedra on the private equity (PE) sector [W7] provides further evidence of the factors that drive both change and stability in a sector. We show what has allowed the PE sector to maintain more stability than originally anticipated, as well as what has underpinned the changes that have taken place in the context of the key relationships in that sector—that is, changes between General and Limited Partners. To showcase the links between different levels of analysis in this context, we examine how issues at a lower level of abstraction (in particular, career evolution dynamics and governance of PE firms) shape forces at the level of the sector overall.

Further work has considered empirical support for the impact of (changing) Industry Architectures. My *MDE* paper [R3] takes an international comparative analysis. It asks the question, are Industry Architectures a predictor of success in global expansion? Focusing on sectors such as construction and mortgage banking in advanced western economies, I show how similar sectors are very

differently organized. These differences in architectures, enshrined in local regulations, standards, and laws, show that the division of labour, and Industry Architectures in general, are not the result of technological determinism and the inescapable transactional arrangements that go with them. Rather, they are the result of sector- and country-specific struggles between firms to organize the division of labour and stabilize it through institutional arrangements that support the dominant firms. I also consider how these differences affect the prospects of firms that wish to expand abroad. Drawing on qualitative evidence, I argue that such architectural differences do matter. In my quantitative paper with A. Kudina in *GSI* [R5], we take these predictions and test them in a sample of firms that expanded globally. Our analysis confirms that the similarity of home and host Industry Architecture (and the modularity of the sector) is a predictor of success with global expansion.

As a result of the interest in the concept of Industry Architectures, and to further encourage work in this area, I co-edited a Special Issue of *EMR* on “Industry Architectures and the Dynamics of Knowledge Integration” along with S. Brusoni and A. Prencipe. In our opening essay [R4], we argued that firms not only need to consider how to integrate knowledge from within and outside their boundaries; they also need to consider how their strategies will shape their Industry Architectures – which in turn will affect their prospects. Two of the IA papers in that SI have obtained three-digit citation counts, suggesting this is a trend that has been followed fairly broadly.

4. *Heterogeneity and competitive dynamics*

Whereas my research on vertical structure and Industry Architectures takes heterogeneity as a starting point, I have recently focused on heterogeneity more directly. This work considers both the emergence and competitive implications of heterogeneity – as well as its implications for policy.

Where does heterogeneity in a sector come from, and how does it combine with agency to drive capabilities and sectoral rules? My *OrgSci* paper with S. Winter [A8], drawing on a number of detailed sectoral examples and engaging in theoretical development, considers the origins of heterogeneity. It also discusses the nature of the (imperfect) mechanisms to weed it out – imitation and competition. We explain how Industry Architecture reduces heterogeneity along a number of dimensions in a sector, and how this relates to agency to change the architecture itself.

With heterogeneity as a given, how do firms choose their scope? An earlier paper with S. Winter in *JMS* [R2] takes heterogeneity as its starting point and looks at the choices faced by entrepreneurs when they are endowed with idiosyncratic and superior ways to produce along a value chain. By looking at a new venture in the context of competition (and limited access to capital markets), we demonstrate that even elementary choices (e.g., whether or not a firm will be integrated) depend more on the nature of the idiosyncratic advantage in the context of the firm’s capacity and demand conditions in a sector. This is contrasted to generic sectoral features such as transaction costs, which are often inferred, without, we would argue, due appreciation of other factors at play.

My modelling paper in *SMJ*, co-authored with S. Winter and S. Kassberger [A9], looks at the competitive implications of heterogeneity. The questions it asks go back to some fundamental issues in the economics of strategy: How does capability heterogeneity combine with industry evolution and the operation of competition in driving profits? What lies behind “sustainable” profits, and what role does heterogeneity play in them? Taking heterogeneous firms under a competitive regime, we

ask what explains the co-existence of differentially capable firms in equilibrium, even barring the imperfections we allude to in our previous qualitative and theoretical work. We show that a sufficient condition for persistent heterogeneity is the existence of a (potentially one-off) customization cost that turns generic inputs into idiosyncratic resources that a firm can use. Our modelling device can thus resolve the thorny problem of the quasi-permanent attachment of resources, and it can also help us consider the dynamics in a sector with heterogeneous firms. We show that customization costs alone (even absent imperfections in the input and output markets) can lead to sustainable profits. We also demonstrate that, if there is heterogeneity, sustainable profits are typically only a small part of total profitability in a sector (over time). Given the pervasive documented heterogeneity in sectors, we believe this model may help redirect some research efforts in our field, which has been (perhaps unduly) infatuated with sustainable advantage as opposed to (potentially transient) profit.

What if heterogeneity shifts from one sector to a set of vertically related sectors? How should we adjust our analytical apparatus? My working paper with C. Wolter and F. Veloso [W6] considers how profits evolve in a sector with two vertically related segments, which may face different potential values of transaction costs. Building on my earlier model ([A7]), this paper looks at profits, as opposed to scope, as the dependent variable of interest, and it considers a heterogeneous sector that evolves towards competitive equilibrium. It shows that transaction costs can act as an “isolating mechanism”, sustaining profits (especially for integrated firms) and slowing down the hand of selection. It also shows how an innovation in one part of the value chain (an upstream innovation) can shape profits not only upstream (where innovators outcompete incumbents) but also downstream, where, despite the lack of strategic interaction, such assemblers become “bottlenecks”: valuable as complements, and as such able to appropriate a great part of the collective value add. By considering different types of innovation (e.g., modelled as an improvement of productive capabilities vs. improvement in learning rates, or as available to entrants vs. disproportionately available to incumbents), we can link the dynamics of profit migration (and of “ripples along the value chain”) to the current strategy literature.

But, can we see “bottlenecks”, which I theorize about from my *ResPol* [Q2] onwards, in empirical settings? This idea on bottlenecks is behind my paper with Tae in *OrgSci* [A10], which empirically considers the role of heterogeneity within segments and how this shapes a segment’s ability to capture value in a sector; my HBR with MacDuffie [P2] expands this line of thought. Heterogeneity between firms and its performance implications is also central to my current work with my new PhD student, Nina Teng: we consider the way automobile OEMs responded differently to the same shock, and we examine the ride-hailing market in Asia and its dynamics.

5. *Roots to branches: Understanding the impact of boundary choices and business ecosystems*

My more recent work provides theoretical as well as empirical elaboration of the research programme outlined above. The two different “branches” I consider are, first, how can we (systematically) see how firms choose their boundaries as the sector around them evolves, and how does this affect their profitability? And, second, what lies behind a hotly discussed and very particular type of Industry Architecture—a business ecosystem?

Addressing the first “branch”, my large-scale empirical work with the New York Fed examines firms’ choices as they determine their scope. The opportunity to build a comprehensive database of *all* the firms in a sector that started narrow, experimented with broadening scope, and changed its fortunes in so doing was too good to pass, if very time-consuming. The systematic evidence I gathered allowed me to consider, with much greater precision than before, the role of firms’ decisions as they choose their boundaries and their performance implications.

In our paper under review in *SMJ*, Cetorelli, Stern, and I [SA1] look at relatedness. How does the choice of segments where firms expand (when they enter new areas) affect their performance? Our data, drawing on banks in the United States, show that (a) diversification into new segments has an order of magnitude greater performance impact compared to areas that are part of the bank portfolio, and (b) the overall negative impact from moving into new areas becomes a net positive if a bank moves into a related area. More important, we show that relatedness itself changes over time, and firms that move closer to this shifting frontier of what the sector looks like tend to over-perform their peers. This validates the predictions of Teece et al (1994), which had never been put systematically to the test.

The findings of this paper, though, raise the question of whether the benefits of such choice of scope are due to a bias for conformity. Are firms that simply look like each other rewarded in terms of performance metrics? And, more broadly, what is the performance impact of timing of entry into new segments, or the value of early vs. late adopters of particular segments? I address this diffusion-type issue, which has not yet been systematically considered in the context of scope, in the second paper on scope and performance (included in this promotional package) with N. Cetorelli (under review in *ASQ* [SA2]). We find that far from paying a performance penalty for disrupting a sector’s norms, trailblazers wind up better off than those who enter later. We also find that this benefit declines over time, becoming a liability for banks that enter new segments last, and we show how these findings differ depending on income vs. stock-market measures. We further illustrate how the ultimate popularity of a segment affects both the upside and downside of early entry. Thus, we argue that boundary choices should be seen in their historical context and as part of a diffusion process that differentially benefits (or burdens) early vs. late entrants.

The next few projects based on this remarkably rich database will provide additional insight into the links between firms’ boundary choices and their aspirations, as we leverage our findings on how broadening scope affects the variability of performance as an outcome. We will also examine how the order of adding and eliminating segments, and the choice of entry mode (from full ownership to non-equity involvement) in new segments, affects performance.

The second “branch” building on the work done so far concerns the role of ecosystems, that is, the sets of firms that co-specialize to provide a common product or service, and which have become increasingly important in today’s economy. My recent *SMJ* with C. Cennamo and A. Gawer [A12] (included in this package) is a foundational paper that tries to clarify this construct and relate it to previous literature and to the phenomenological discussion. This paper asks, what is unique and new about ecosystems? Beyond the attractiveness of the term and its evocative nature, can we find any analytical foundations to demarcate what is different and link this to existing research? Our paper is an attempt to provide a theoretical foundation for ecosystems. We argue that ecosystems (and the

relational dynamics they engender) emerge when modularity arises and when non-generic complementarities tie firms together in the pursuit of a commonly shared objective. We explain how ecosystem ties differ under unique or supermodular complements in production or consumption, providing a typology with links to the resulting strategic dynamics. The paper aims to clarify what makes ecosystems distinct, and it suggests that ecosystems, far from being a “solution”, should be seen as one of the potential structures that might emerge in the context of an Industry Architecture.

The interest in ecosystems is not only a feature of the academic literature. Practitioners, too, have become interested: “Digital ecosystems” was the third most important priority the 2018 WEF Chief Strategy Officer meeting, and the word “ecosystem” appeared 160 times in Alibaba’s recent IPO prospectus. Yet there seems to be confusion about ecosystems in practice, and my recent paper with BCG’s Martin Reeves (the Head of their Henderson Institute) and J Fuller (under review in *SMR* [SP1]) tries to illuminate some of these issues and provide more structure moving forward.

My ongoing work with my new PhD N Teng and JP MacDuffie will explore some of these ecosystem dynamics, looking at mobility. Our key question is, why do OEMs in the automotive sector vary so widely in terms of their responses to the (common) threat from “mobility as a service”, with some integrating into it, others investing (e.g., Toyota and Hyundai into Grab, GM into Lyft), and others creating a wide portfolio of small investments (Daimler)? And how are their responses evaluated (differently) by analysts? Drawing on excellent data and access, we will build a comparative case-study of firms facing (ecosystem) disruption.

I explore additional ecosystem competition questions in my other project with N Teng, which focuses on ride-hailing as it developed in Asia, where local firms were able to set up ecosystems to rival global dominant firms. How were these firms able to overcome network effects of bigger rivals? What is the role of aligning ecosystem partners in locals’ ability to dominate a platform market? And how can we track the impact of competition not only between but also within ecosystems?

I expect my research on ecosystems to be further enhanced (and informed) through my work with the World Economic Forum, where I am the academic co-lead of their project on Platforms and Digital Ecosystems. We are working towards a report in Q1, 2019, after successful workshops in New York and Tianjin this year, and this has provided access to interesting evidence. Likewise, I am in the final process of negotiating data access for BCG’s in-house research on 31 ecosystems, their structure, and their membership criteria. Our aim is to develop a collaborative structure that will draw on BCG consultants, under my guidance, to explore the function and effectiveness of ecosystems. This should yield data for academic research and for practitioner impact. I think the access to real-world, cutting edge data augurs well for future projects, as there seem to be a number of issues that can be explored. I have also seen an increase in offers to collaborate on ecosystem research across the board, mostly from faculty in other institutions, but also from one of LBS’s new PhD students, Tyler Burrows, who has asked me to supervise his work on healthcare ecosystems.

External visibility in academe

Since I was awarded tenure in 2007, I have given 55 invited talks (including multiple seminars at Wharton, Harvard, MIT, and Stanford), presented in 26 sessions at academic conferences, and presented in 28 symposia or panels, including a number of plenary and keynote panels, many of which I organized. I have organized or co-organized several academic events, and my ISI citation count has increased forty-fold. The recent digital initiative of SAGE Publishers, Sage Knowledge, has included my video interview on industry architecture, chronicling the development of the construct.

In 2006, I was invited to become Associate Editor of *Industrial & Corporate Change*, and in 2015 I was offered the position of co-Editor of this journal.

In terms of academic offices, I was elected to the Executive Committee of the Business Policy and Strategy Division of the Academy of Management in 2008. I was also elected Representative-at-large at the Strategic Management Society's Competitive Strategy IG in 2009; Representative-at-large at the Knowledge Management and Innovation IG in 2011; and Vice-President of the European Academy of Management in 2013.

Citation Count, as of October 1, 2018

ISI Web of Knowledge:	1,299 total citations. H-index: 13.
Google Scholar:	4,520 total citations. H-index: 21. I-10 index: 29.

Linking research with practice and external visibility

Since my doctoral years, I have been interested not only in the translation of research for practice, but also the articulation of research questions informed by real world concerns. In this spirit, some of my output has been predicated on helping either practitioners or policymakers take a fresh, research-based perspective.

On the strategy side, my AIM Industry paper [I1] and my paper in *Insights* [I4] consider how firms can compete by shaping their industry's architecture, and how they can try to become the bottleneck. Whereas these two papers were straightforward applications of my research into practice, my 2010 *HBR* [P1] and 2011 *BSR* [I2] combine my interest in industry dynamics with my side-interest in cognition and representation, which led me to co-organize workshops with M. Warglien in London and Venice. When industry boundaries change so fast, should we also change the way we represent and depict industry environments? These articles propose that managers might be well advised to eschew traditional representations of their firm and sector and track sectoral dynamics more directly by critically considering a firm's (and sector's) "playscript". This topic has been recently (and famously) reprised by Jeff Bezos in a 2017 letter to shareholders, noting that given the changes in its competitive environment, Amazon opted to dispense with PowerPoint slides and strategy tools and focus instead on "plausible stories".

My 2013 *HBR* with JP MacDuffie [P2] drew on the findings of the empirical analysis ultimately published with J. Tae in *OrgSci* [A10] and later in *SMJ* [A11]. Drawing on and operationalizing research in Industry Architectures, we provided a synthetic account that can explain both value migration and value stasis, and we provided a prescriptive framework for managers of established businesses (potentially threatened by value migration) and aspiring entrants alike. A number of blog posts (in *HBR.com*, *Forbes.com*, *Huffington Post*, and other outlets, mentioned in my CV) and my recent *BSR* [I15] further elaborate on this point, providing additional nuance and illustration. Finally, my working paper with BCG's M Reeves (under review, *SMR* [SA2]) extends my recent work on ecosystems and considers myths, reality, and key questions relating to business ecosystems.

The study of Industry Architectures also relates to policy. A series of dinners co-sponsored by the World Economic Forum, McKinsey Global Institute, and BarCap led to the publication of a White Paper on the Future of Finance [I3], inspired by work on the changing architecture of the policy sector. As a result of this, I was asked to organize a set of meetings in the Houses of Parliament (jointly with the Industry Parliament Trust) linking the key regulators with MPs and industry leaders, and liaising with the Independent Commission of Banking, feeding into WEF work.

In terms of research-based policy work, my working paper with S. Winter [W1] looks at how the mortgage banking sector evolved towards disaster. This paper and my *Business History* article [R7] substantiate the claim (found in the opening paragraph of this statement) that changes in the architecture of the financial services sector, and mortgage banking in particular, predictably primed the reckless to survive and outcompete more prudent firms. But, what are the implications of this analysis for policy? In the *JFP* paper with Drexler and Saavedra [R6], we answer this question, taking a structural approach to potential future regulation in the financial services sector. We offer concrete suggestions, not only looking at the rear-view mirror but also looking ahead.

In addition to writing for practitioners, I have engaged with practice fairly broadly. I have given 36 industry talks over the past four years; worked with more than 30 companies in executive development or other thought leadership activities; and, as detailed in my CV, have been involved with policy and strategy initiatives. In terms of industry visibility, I have participated in thought leadership events, organizing in particular an event for *McKinsey Quarterly's* 50th anniversary on the role of strategy frameworks in contemporary practice. The transcript of this event, along with an opinion piece, was subsequently published [I9]. I have participated in numerous corporate and industry events, and I was a member of the WEF's Global Agenda Council on the Global Financial System (2011-2013) and then the Future of Investments (2014-2015). PwC (in 2017) and Accenture (in 2018) have featured interviews with me on innovation, change and strategy in their publications. I was recently recognized, for my link between academic and applied work, as the recipient of the 2018 "Theory to Practice Award", sponsored by the WU in Vienna (and StrategieForum), whose past recipients include Kathy Eisenhardt and Freek Vermeulen.

More recently, I was invited by BCG to be an academic collaborator, and we are now in the process of finalizing our agreement. We have been working on ecosystems and dealing with disruption with firms such as IDEO and Accenture. I have also spoken at events organized by the *Economist*, TEDx, the Global Drucker Foundation and industry associations (ISI, AHCC, FIDI, ARMA, BBA), and I have written short pieces for practice-oriented journals such as *Business Strategy Review*, *Business*

Agenda, Insights, and The Banker, and policy journals such as *EU Vox* and *Europe's World*. I have been interviewed by the *Financial Times, City AM, The Guardian, the Economist*, and by *CNN, BBC4, NPR*. I have written OpEds (especially in Greece, for *Kathimerini* and *To Vima*, but also for newspapers such as *El Pais*) and have maintained a modest blogging profile through *Harvard Business Review* and the *Huffington Post*. Finally, given my policy interest, I spent time as an active participant in forums related to the intersection of strategy and policy, including the financial services sector, and on my WEF role, which involved a private session I organized with the European team in Davos in 2013 and public sessions in various WEF meetings (2011–15). I was also a member of the High Level Group for Innovation Policy Management in Europe (2011–13), which was created to advise Commission Chairman Van Rompuy. I am currently one of the three Academic Leads of the WEF's Digital Platforms & Ecosystems Working Group, and I have organized presentations, workshops, and sessions in New York and Tianjin in 2018 and I am planning for Davos in 2019.

Teaching and Internal Contribution

My teaching in LBS has been split between our executive and degree programmes. On degree programmes, I have taught strategy, most recently for Sloan Fellows and EMBA Globals. Most of my energy, though, has gone to turn “Managing Corporate Turnarounds” into the most popular elective in Strategy & Entrepreneurship, climbing from two to seven streams (of which I taught four). Having inherited the course to assist our Area planning, I fully redesigned it, wrote 14 new cases for all but one of the sessions (most with AV interactive material), and co-designed several sessions with industry leaders. I have handed over the excess streams to colleagues, creating teaching plans and aids used by three LBS colleagues who have taught the excess demand. I also taught (and designed) two doctoral courses: Basic Readings in Business and, more recently, Economic Foundations of Strategy (with I. Ioannou), which has been quite involved and gratifying.

On the executive front, I have developed new material for our open enrolment course on “Developing Strategy through Value Creation” (a course I have participated in since its launch), and I created new sessions on Digital Ecosystems in our new course on Managing Digital Disruption. On custom executive education, given my greater involvement in policy and in research programmes over the past few years, I have significantly reduced the number of days taught (from around 18 to 1), and I have somewhat increased the amount of time doing “thought leadership” in terms of how organizations should respond to shifting contexts.

In terms of internal contribution, I coordinated the Strategy & Entrepreneurship faculty recruitment from 2005 to 2011, have been responsible for most of our faculty retreats since I joined the School, was responsible for the seminar series for six years, have organized events such as the Ghoshal Conference, and am currently responsible for External Relations of our Area.

At the level of the School, I have been a member of the Academic Policy Committee and the Appointments Sub-committee (twice). I have also been actively involved with our Advancement team and have presented at a number of alumni and development events in London, Athens, Milan, Rome, Madrid, New York, San Francisco, Dubai, Singapore, Bangkok, and Tokyo.

Appendix: Contextualizing research outputs

This Appendix provides two additional contextual factors that help explain my research focus. First, I consider the way in which I engage with empirical investigation, showing links between past and ongoing projects. Second, I provide information to explain some additional, and perhaps superficially less related, work I have done on turnaround, including at the level of a country (Greece), where my teaching engagement engendered both policy and research work.

1. *Deep dives in architectural change: Banking, private equity, mobility – and ecosystems*

One of the attributes of my research is my in-depth engagement in particular empirical settings, and the desire to build a solid, comprehensive understanding of overall sectoral patterns and firm strategies within them. During my pre-tenure research, I drew on the empirical setting in which I had invested over three years (during and after my PhD), mortgage banking, which yielded qualitative and quantitative papers. I then focused on particular settings, often with co-authors: the construction sector in my paper with E. Cacciatori [R1], a fashion company with S. Billinger [A5], and the Greek military in my *OrgSci* [A6] article. These were complemented by theoretical research that drew on several different sectoral examples (in *OrgSci*, *SMJ*, *ResPol*, *ICC*). Post-tenure, I have had the time to engage in additional deep dives, involving both quantitative and qualitative data analysis.

The most significant area of interest has been the evolution of financial intermediation—a topic I became particularly interested in because of the financial crisis which, I thought, was driven to a significant extent by a change in the sector’s Industry Architecture. Starting in 2009, I invested significant time in understanding the evolution of the sector and communicating with different audiences (e.g., through a symposium at the 2010 AEA with far more established presenters—G. Dosi, S. Winter, B. Shiller, and J. Stiglitz). Engaging with finance and economics proved to be a major investment, which offered the opportunity (and challenge) of becoming immersed in related discussions in other literatures. Eventually, through a long-winded process of trial and error, I converged to contributions focused on strategy, as opposed to venturing into fields outside my own.

My interest in banking has led to the papers with Drexler and Saavedra in *JFP* [R6], a historical overview of the structural drivers of the crisis in *Business History* [R7], and my paper with Winter [W1]. It also led to a three-year process of building a database with the New York Fed, which is the first empirical analysis of any sector’s full universe of firms and their changes of scope, linked to performance. This, and another two years of developing papers and sharing them with audiences in strategy but also finance, has led to the papers with Cetorelli and Stern [SA1] and Cetorelli [SA2] (included in this package). Several follow-on projects have been sketched out.

A second project has been the detailed investigation of Alternative Investments (where, via the WEF, I got excellent data access and co-authored three reports on structural changes in the sector [I12]). This involved around 100 interviews, seven workshops, and archival data collection. This was further narrowed down to Private Equity, where I engaged in two additional projects with the Private Equity Institute in LBS, leading to two Adveq reports [I13, I14]. I also created a qualitative / historical repository and a unique database (on fundraising, fund terms and conditions, and performance) that I hope to leverage in a future paper. The qualitative and historical evidence led to the paper with Saavedra [W7], currently copy-edited for submission to *OrgSci*.

A third major investment has been research in the automotive sector. The initial research undertaken with JP MacDuffie (included in this package for review) drew on archival and qualitative evidence, complemented by qualitative research, which resulted in our *SMJ* [A11]. This evidence was further enhanced by a detailed analysis of a database we put together with the market capitalization of all participants in the automotive manufacturing value chain, apportioned by industry codes (NAICS) so as to provide some evidence on how value distribution in the sector overall has changed over time. This database, cleaned and further developed with my PhD student J Tae, was compared and contrasted with data on dynamics of the computer sector. I contrasted the quantitative computer sector data with the automotive sector data in my *HBR* with MacDuffie [P2]. The computer sector was turned into my paper with Tae in *OrgSci* (included in this package for review [A10]).

In the past two years, JP MacDuffie and I, after the publication of our *SMJ* [A11], have engaged in a further set of data and exploratory analysis on the evolution of the automotive sector, broadening this from the manufacturing of cars to encompass the full gamut of mobility services. This shift, predicated by my interest in the dynamics of ecosystems, has led to two events I co-organized in collaboration with the Wharton-based Programme for Mobility and Vehicle Innovation—the successor to MIT’s IMVP programme. I hosted such an event in London in November 2017, with many of the key actors in the area of mobility in Europe and the US, with the support of the Institute of Innovation and Entrepreneurship and of the LBS Higher Education Investment Fund. Some of the take-aways from this event have been written up in my recent *LBSR* article [115]. This successful event gave us significant data access in the mobility area, and we are following up with another event, in Tokyo, in November 2018. There, N Teng, my new PhD, and I are presenting our emerging conclusions on the evolution of mobility dynamics, seen from the perspective of both traditional OEMs and the different participants in the lucrative ride-hailing business.

In addition to these industry deep-dives, two of which have been concluded (with papers now being produced) and one (on mobility) still in progress, my other data-gathering exercise, which I expect to keep me busy in the next few years, is on the currently buoyant topic of ecosystems. As of the summer of 2018, I have been appointed as one of the lead academics of the WEF’s initiative on digital platforms and ecosystems. I have used the meetings organized by the WEF, which draw a number of interesting firms, as an opportunity to learn and try out new ideas, as well as an opportunity to gather data. Thus, I will use the report scheduled for 2019, with the support of Deloitte, as an opportunity to provide more insight into the nature and function of ecosystems, and I will use the meetings as settings to help me gather more data. Relatedly, I am now in the final stages of discussions with BCG’s Global Advantage Practice, and its Henderson Institute, to access their data and leverage consultant time in creating qualitative and quantitative evidence to be used in future research.

2. *From research to teaching: Turnarounds and organization structure*

One final aspect of my academic trajectory might help explain my academic output and outreach. To provide some background for this, in 2008, after receiving tenure, I was asked to teach a course that, at the time, I was neither interested in nor qualified to teach, on Managing Corporate Turnarounds. This presented me with an exciting challenge, albeit one that significantly dented my research

productivity post-tenure for over two years. This phenomenologically-focused class was taught by an adjunct faculty and relied on story-telling, which I could not (and did not want to) emulate. As such, after an intense period of reading up on the subject and following the class as it was taught, I fully redesigned it, changing, ultimately, almost all sessions. I wrote 14 cases specifically for my course, including focused cases on the Gulf for my module in Dubai. I was also involved with professional associations from the sector—for example, I became a judge in the “Turnaround of the Year” awards—and I connected more tightly to that community so as to bring guest speakers to the LBS classroom. Having thus become familiar with the field of turnarounds, I eventually started looking at issues of turnaround from a research perspective.

This experience also led to my increasing interest in Greece (my native country), where I could detect all the organizational pathologies I teach in my course, bundled, around 2010/11, with ignorance of both the financial issues around debt distress and restructuring and the steps required to undertake a turnaround, even among senior policymakers. As such, I became involved, together with some of my senior economist colleagues (especially R. Portes and E. Papaioannou) in behind-closed-doors meetings in LBS aimed at the key decision-makers on both the creditor side and in Greece in 2010, 2011, and 2014. These meetings helped structure the debate between participants throughout the political spectrum—Finance and Labour Ministers, MPs, senior bankers, EU and IMF officials, and a set of industry specialists on the Greek debt crisis. This led to the creation of a report with R. Portes and LSE’s D. Vayanos [W4] and several articles on Greece and EU dynamics [I5, I6, I8].

My involvement on these topics also led me to become a frequent OpEd contributor to the main Greek newspapers and to engage in media—CNN in particular, but also BBC, NPR, and several others. I continued working with my LBS colleagues for initiatives replicating our initial meeting. Also, working with the Greek LBS Alumni club, I helped organize (and fundraise for) another large meeting in Athens, which was well received. Furthermore, working with Administrative Redesign Minister Mitsotakis and some local change agents, coordinated via the LBS alumni network, we set up a bottom-up initiative to improve the Greek Public Administration, dubbed “RedesignGreece”. This project aimed to open-source the process of administrative redesign, bypassing organizational resistance to change, and engaging the private sector collaboratively with those within the administration who would desire change. After formally starting, this activity was halted given changes in the political scene in 2014.

More broadly, my engagement with the press and appearances in Greece subsided as awareness around the Greek crisis increased, as I felt I would have less value add in terms of impact, and as I engaged in research projects that competed for my attention. That said, I spent time in 2016/17 consolidating the work I had done to understand the Greek organizational pathologies, and I wrote the chapter on public administration and the organizational foundations of the Greek crisis in MIT Press’s edited book on Greece, co-edited by Sir Chris Pissarides, Nobel Laureate in Economics [W8]. This wrapped up my Greek engagement, as well as my involvement with the EU and debt management dynamics, a relevant but delimited aside in terms of my main focus, which drew on my (unscheduled) expertise in turnarounds and change management, a topic I may want to develop further if and as circumstances might allow.

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Q list Journals

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