DAVID OVERSHADOWS GOLIATH: SPECIALIZING IN GENERALITY FOR INTERNATIONALIZATION IN THE GLOBAL MOBILE MONEY INDUSTRY[1]

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RESEARCH SUMMARY

We investigate the emergence of a global industry based on digital innovation by studying how the international expansion of pioneering firms relates to their characteristics and strategies for capability development and deployment. Using detailed archival data on mobile money, we classify pioneers that internationalize based on whether they were multinational diversifying entrants, developed country startups, or developing country startups. Our quantitative evidence suggests developing country startups that internationalize have the highest impact on the industry through subsequent platform launches. Digging deeper into the business histories of each firm, we uncover why: these startups "specialize in generality" by developing and deploying "bundled knowledge" capital consisting of technology, problem-solving and alliance management capabilities, thereby offsetting their physical capital scale and scope disadvantages relative to multinational diversifying entrants.

MANAGERIAL SUMMARY

Our study demonstrates how pioneers in mobile money created and utilized capabilities for international expansion. We show that among pioneers who engaged in internationalization, developing country startups had a greater global footprint than both developed country startups and diversifying entrant multinationals, even though conventional wisdom might predict greater impact for the latter two types. We link such impact of developing country startups to their focus on developing "bundled knowledge" capital, consisting of technology, problem solving and alliance management capabilities which they could leverage in multiple countries. Not only did these firms grow through collaboration, they created and democratized access to needed financial services worldwide.

Historically, industries emerged in developed countries and then "trickled-down" to developing countries (Grossman and Helpman, 1991; Krugman, 1979; Vernon, 1966). Rosenberg (1963) explained such diffusion patterns by highlighting the important role of specialization: developing countries lagged in physical capital goods innovation because it required deep specialization in physical infrastructure and accompanying development of specialized technical skills in labor. However, many industries based on digital technology are driven by knowledge capital, while building on established physical capital infrastructure. Moreover, they may identify and serve unmet needs in developing countries that are not as acute in developed countries (Jack and Suri, 2014; Zanello *et al.*, 2016). Also, from a strategic management perspective, it is critical to understand the microfoundations of global level industry emergence and diffusion patterns. Accordingly, our study seeks to illuminate these patterns by examining whether and how a diverse set of industry pioneers (based on location and initial characteristics) differentially developed and deployed specialized capabilities to engage in international expansion.

We do so in the context of the mobile money industry. Mobile money is a digital innovation that utilizes mobile networks to broker "cash"-free financial transactions. The industry was "born global" through concurrent pioneering efforts in 20 countries (both developed and developing). The context is ideal for our study, because it provides rich variation in the location of pioneering platform launch, capabilities, and expansion patterns of pioneering firms within the same industry setting. We utilize historical methodology (Braguinsky and Hounshell, 2016; Bucheli and Wadhwani, 2014) to triangulate across quantitative and business history data for all 31 pioneering firms during the industry's pre-firm takeoff stage (1997-2007). At the firm level, we examine whether and how they subsequently internationalized during its growth stage (2008-2017). We then aggregate internationalization data by firm type to shed light on the global diffusion patterns in the industry.

We classify our census of mobile money pioneering firms based on three key characteristics highlighted in existing research: pre-entry experience (startup vs. diversifying entrant), multinational status (single vs. multiple country operations), and location of pioneering platform launch (developed vs. developing country). We find evidence of strong differences in the extent to which

pioneers with different characteristics expand internationally. None of the single country diversifying entrants expanded internationally—these pioneers build mobile money platforms in their country of origin, but have little impact on the overall industry beyond this scope. Among the other pioneers, propensity of international expansion was lowest for developing country startups and highest for multinational diversifying entrants.

Focusing our attention on pioneers that expanded internationally, we distinguish between three distinct groups: the multinational diversifying entrants (Goliaths), developed country startups (David 1s) and developing country startups (David 2s). We find that David 2s overshadow both David 1s and Goliaths in terms of the number of platforms subsequently launched in other countries. Our detailed examination of pioneering firm business histories uncovers that this pattern is related to the capability development and deployment strategies employed by the Davids and Goliaths. The Goliaths' internationalization strategy largely consisted of internal expansion to countries where they had pre-existing physical, capital-intensive investments in mobile networks and a built-in customer base. David 2s' internationalization strategy, on the other hand, relied on alliances with partners for these downstream capabilities. This strategy led David 2s to focus on developing and deploying "bundled knowledge" capital that could be leveraged in multiple national markets. Such bundles of knowledge consisted not merely of technological capabilities, but also problem solving capabilities for developing and leveraging deep contextual knowledge of developing country-specific user needs and institutions, as well as alliance management capabilities to flexibly adapt the technologies for subsequent platform launches. As mobile network operators across the globe sought to enter the mobile money industry, they relied on the David 2s as strong and reliable partners to problem-solve and adapt to their own context. Finally, David 1s initially adopted a go-at-it-alone strategy, striving to build their own downstream client base to complement their upstream technological capabilities. In spite of similar, and perhaps even superior, initial technology assets relative to David 2s, the David 1s struggled even in terms of survival, let alone in their efforts at international expansion. However, their acquirers were more successful at international expansion,

because they restructured capabilities, shed downstream presence, and, similar to the David 2s, engaged in alliances to build mobile money platforms for downstream providers.

Understanding how firms internationalize in an industry based on digital innovation and how their strategies shape the emergent industry is important for theory, practice, and policy. Conventional wisdom identifying multinationals as important drivers of innovation diffusion (Fitzgerald, 2009; Kleinschmidt, 2011; Prahalad, 2006; Winter and Govindarajan, 2015) is consistent with our observations of Goliaths. For example, the launch and subsequent expansion of the mobile money platform M-PESA by Vodafone (a multinational diversifying entrant) is the most well-known success case in the industry (see, *e.g.*, Aker and Mbiti, 2010; Jack and Suri, 2014). However, as we uncover in this paper, Goliaths like Vodafone were actually overall *less* influential for global diffusion of innovation, because they were limited to countries where they had existing downstream presence. In contrast, the David 2s, presumably doubly disadvantaged given their developing country startup status, were not tethered by this constraint and able to scale their operations across countries due to bundled knowledge capabilities. Thus, our study contributes to the literature by showing that "specializing in generality" strategies (Conti, Gambardella, and Novelli, 2019; Gambardella and McGahan, 2010) can be most effective for cumulative global industry diffusion. Mobile money's emergence is illustrative of other instances of contemporary industries such as mobile health, peer-to-peer lending, e-cigarettes, and blockchain technology related industries. These industries, like mobile money, may well be the harbinger of other industries of the future wherein "general purpose technologies" such as the Internet and mobile network infrastructure have leveled the playing field for the launch of digital innovations in developing and developed countries alike (Comin, Hobijn, and Rovito, 2008). Accordingly, our study's theoretical and managerial implications may well relate to industry contexts where digital innovations leverage existing infrastructure, underpinned by entrepreneurial efforts by startups and multinationals alike.

CONCEPTUAL BACKDROP

Industry Evolution and International Diffusion of Innovation: The Role of Scale and Scope

Rooted in the Smith-Stigler idea that the division of labor is limited by the size of the market (Smith, 1776; Stigler, 1951), scholars have examined how innovations cause industries to emerge and evolve within a single country (Gort and Klepper, 1982), and how such innovations may subsequently diffuse across countries (Akamatsu, 1962; Vernon, 1966). Of special relevance to our study is Rosenberg's (1963) extension of the concept of market size to include not only scale, but also scope, *i.e.,* the extent to which an innovation was facilitated by economies of specialization.[1] According to this view, innovations of a capital-saving type are especially relevant to developing countries, but face almost unsurmountable hurdles there because in those countries, "*the failure to achieve a well developed capital goods sector means a failure to provide the basic technical skills and knowledge necessary to the development of capital-saving techniques*" (Rosenberg, 1963: 225).

Two important implications of market scale and scope for industry evolution and international diffusion held true for much of the 20th century. First, developing countries lacked the capabilities to develop novel technologies. Second, an important corollary was that innovations catered to unmet needs in the developed countries first and foremost. Thus, needs in developing countries that were not acute in developed countries were often not addressed. The development of critical infrastructure (*e.g.*, Internet and mobile communications) in emerging and developing economies alike, however, suggest that developing countries are primed to contribute far more to the development of new industries than they did in the recent past. As a result, the conventional view that industries emerge in developed countries to cater to their unmet needs primarily is not necessarily applicable to many modern industries wherein digital innovations build on existing physical capital infrastructure. In other words, the underlying premise that resources and capabilities for creating novel technology-need nexus of products and services, and even altogether new industries, are only available in developed countries needs to be systematically re-examined. In particular, we need to develop an understanding of whether and how market scale and scope considerations result in different implications for industries that may be "born global."

[1] *"The importance of the growth in markets is not necessarily bigness but rather an increased division of labour among firms… the ability to concentrate on a limited range of products, performing specific functions and meeting highly specialized requirements." (Rosenberg, 1963: 219)*

Pioneering Firm Characteristics and Strategies: Microfoundations of Industry Evolution and International Diffusion

Of course, industries do not just emerge and evolve, and innovations do not just diffuse across countries. At the firm level and from a strategic management perspective, scholars have noted the important role played by pioneers in creation and growth of nascent industries (Klepper, 2002; Moeen, Agarwal, and Shah, 2020).

Consistent with the Smith-Stigler-Rosenberg conceptualization of market scale and scope, studies have documented a diversifying entrant performance advantage among pioneering entrants (Helfat and Lieberman, 2002; Klepper and Simons, 2000) and the dominant role of multinationals in the international diffusion of innovation (Jones, 2005). Relative to startups, the observable characteristics of diversified and multinational status have been linked to underlying capabilities such as access to complementary assets (Dunning and Lundan, 2008; Mitchell, 1991; Teece, 2014), and superior integrative capabilities (Bartlett and Ghoshal, 2002; Buckley and Casson, 1976; Chen, Williams, and Agarwal, 2012; Helfat and Campo-Rembado, 2016). While startups can sometimes benefit from their flexibility (Carroll *et al.*, 1996), startups—particularly those in developing countries—are not believed to be as critical in the international diffusion of innovation (Kiss, Danis, and Cavusgil, 2012).

Budding research has already begun to challenge this received wisdom, and the concomitant assumption that capabilities have to be vertically integrated because markets for specialized capabilities are absent in nascent contexts (Stigler, 1951). For example, though they find pioneers have integrated capabilities at time of entry into the industry, Moeen & Agarwal (2017) and Moeen & Mitchell (2020) provide evidence that rather than only relying on internal development, pioneering firms accessed capabilities through alliances and acquisitions. Building on the scale *vs.* scope distinction (Rosenberg, 1963; Bresnahan & Gambardella, 1988), Conti et al. (2019) note that firms can pursue a "specializing in generality" strategy; that is, invest in general upstream resources and then sell them to downstream players rather than directly enter downstream markets (Conti *et al.*, 2019; Gambardella and McGahan, 2010).

Yet, we lack a systematic industry-level study examining whether and how pioneers in industries based on digital innovation employ different strategies to deploy and develop capabilities for entry into new markets. Specifically, in these industries, individual countries represent unique submarkets or "applications" that enhance the scope of the market. It is unclear whether in this context a diversifying firm or a multinational will necessarily prevail, and whether developing country startups with unique knowledge of unmet needs will necessarily face a disadvantage.

The research gaps identified above motivate our study. We embrace the endogeneity between observable characteristics and underlying capabilities and strategies to utilize an abductive, research-questions based approach rather than a hypothesis testing approach. Specifically, we examine whether and how a diverse set of industry pioneers (based on location and initial characteristics) differentially developed and deployed specialized capabilities to engage in international expansion.

EMPIRICAL CONTEXT, DATA AND METHODS

To address the above research question, we conduct a deep-dive study of the global mobile money industry. Mobile money has achieved significant success in meeting the needs of customers in a developing world, and hence, is a poster child for examining internationalization patterns of firms in a born-global, digital-age context.

Mobile money allows individuals to deposit, send, and withdraw funds on mobile money platforms through virtual accounts on their cell phones. Monetary transactions take place through a mobile phone between two or more parties and include person-to person transfers, e-commerce, salary disbursement, loan repayments, bill payments, and airtime top-up payments from customers to mobile providers. The transactions occur through text messaging features such as SMS or USSD, particularly in the nascent industry stages (when smartphones had not yet been introduced) and in developing countries today (where smartphone penetration is still less than 50%—Silver, 2019). Figure A1 in the online appendix presents an example of how a mobile money transaction occurs.

Mobile money platforms are at the convergence of software technologies and mobile networks. Accordingly, the mobile network operators trade association GSMA (Groupe Spéciale

Mobile Association) defines the mobile money industry to include firms providing customer-facing platforms as well as firms developing the software technology of the platforms.[2] Because mobile money does not need to be linked to formal bank accounts, it is distinct from services offered by traditional banks such as "mobile banking" and "mobile wallets." Mobile payment platforms such as Venmo, PayPal, Zelle, Apple Pay, or WeChat Pay that the reader may be most familiar with are considered "mobile banking" or "mobile wallets" since they require users to link formal bank accounts and are outside the scope of this study.

In a world where over two billion "unbanked" adults do not have access to formal bank accounts—an issue more pronounced in developing countries—mobile money is an innovation that has provided unprecedented access to low cost, secure financial services (Demirgüç-Kunt *et al.*, 2015). Since its inception in 1997, the mobile money industry has already improved the welfare of individuals living in areas with limited access to banking infrastructure (United Nations, 2015). As of 2017, there are 690 million registered mobile money accounts worldwide, and the industry processes an average of $1 billion per day (GSMA, 2017). A recent study found that during a three month period in Uganda, the five million users of financial services saved 12 productive hours "that would otherwise be spent on using traditional transactions payment means" (Digital Impact Awards, 2017).

For researchers, the mobile money industry represents a unique opportunity: to date, a few contemporary globally-born industries have emerged. The study of mobile money represents an opportunity to alter and augment our thinking about the sources of innovation, as well as the requirements for firm and industry evolution.

Data Sources

We triangulated across multiple sources to create a unique database of the population of mobile money firms and the platforms they launched from 1997-2017. We started with creating panel data on mobile money platforms through 2017 using the GSMA's mobile money deployment tracker, supplemented by hand-collected information about the earliest platforms that predate the

[2] Mobile money platforms are typically offered to consumers by mobile network operators, banks, or other third party providers. The development of the technology for mobile money platforms itself is a major undertaking, and can be undertaken in-house by firms offering the platforms, or by independent upstream technology firms.

GSMA data. To this, we added information collected from industry reports published by various organizations (*e.g.,* the World Bank; Brookings; International Finance Corporation; Deloitte; Ernst & Young, etc.), first-hand published accounts and media interviews by the pioneering managers and founders, firms' annual reports, as well as corporate press releases and websites. Using diverse longitudinal data from multiple sources is key to data triangulation (Jick, 1979) and generates a rich understanding of how events unfolded and allows for the identification of key mechanisms.

We believe our extensive search for information, enabled by high levels of digital documentation of industry events, has resulted in a comprehensive and complete database, with rich detail at both the firm and platform levels. As expected, there is variation in data availability across firms/platforms: the histories of more successful and longer surviving ones are better documented. Nonetheless, we were able to gather significant amounts of information even on those that failed. More details about our data sources and triangulation can be found in the online appendix.

Determining the Population of Pioneering Firms

Figure 1 depicts the global emergence and expansion of the mobile money industry from 1997, the year of first commercialization, to 2017. It includes the number of live mobile money platforms, depicted as lines, and the number of new platform launches, depicted by bars, by year and region. When examining trends in the number of industry participants, scholars have documented a hockey-stick pattern that distinguishes between pioneers—those that are the first to commercialize a product and enter in a period of high technological and demand uncertainty—and followers—those that enter after the "takeoff" in the industry (Agarwal and Bayus, 2002; Agarwal and Gort, 2001; Golder and Tellis, 1997). We determined 2007 as the cut-off year for the pre-takeoff stage based on the discriminant analysis procedure introduced in Gort and Klepper (1982). To point, Figure 1 conforms to this standard hockey stick pattern and shows a clear "take-off" in the number of mobile money platforms after 2007. This cutoff also makes sense in the context of industry events and development. Technological and demand uncertainty was reduced in 2007 when M-PESA was launched in Kenya. Its rapid and successful adoption drew worldwide attention and spurred emulation around the world (Aker & Mbiti, 2010; Jack & Suri, 2014). By the next year, two other

pioneers, MTN and Fundamo had launched platforms in over a dozen African and Middle Eastern countries (van Rensburg, 2016). Additionally, the GSMA held its inaugural Mobile Money Summit in 2008 in Cairo, Egypt. By 2014, mobile money was in use in 85% of the countries where the majority of the population lacked access to formal financial institutions (Muthiora, 2015). Figure 1 shows industry concentration in developing regions, with the highest development in the Sub-Saharan Africa regions. As of 2017, GSMA reported 276 mobile money platforms across 90 countries.

[Insert Figure 1 here]

Analytic Approach

Our analytic approach employs historical methodology, consistent with research methods integrating history and organizational studies (Braguinsky and Hounshell, 2016; Bucheli and Wadhwani, 2014). We combine *quantitative* evidence to systematically document relationships between pioneering firm characteristics and whether and how they engaged in international expansion, and *business history* analysis of text-based archival data to understand mechanisms underpinning these patterns in terms of capability development and deployment.

Quantitative Evidence: Guided by the conceptualization above, we coded the archival data to classify pioneering firms based on key firm-level attributes. First, we distinguish between *diversifying entrants* and *startups* based on whether the firm existed prior to their pioneering launch in mobile money. For diversifying entrants, we further distinguish between *multinationals* and *single country* firms based on whether the firm had a presence in multiple countries or one country prior to entering mobile money (all startups are single country firms at the time they enter). Third, we classify firms based on whether the first platforms they launched were in *developed* or *developing* countries, according to how those countries are classified by OECD. We also identify the initial capabilities of the pioneering firms based on whether they consisted of upstream technological capabilities (*upstream technology assets*), downstream market capabilities *(downstream assets*) or *both*.

We then examine whether the pioneering firms engaged in *Internationalization,* defined as the launch of subsequent platforms in other countries. Internationalization efforts involved two

different strategies—internal expansion and alliances.[3] Firms enact an *Internal expansion* strategy when internationalization either leverages existing multinational downstream capabilities (*e.g.,* mobile networks), or requires building capabilities in the country of launch anew (in the case of startups). An *Alliance* strategy occurs when a focal pioneering firm forms an alliance to access either upstream or downstream capabilities for its internationalization. And, *Alliance(s) by acquirer* occurs when a pioneering firm is acquired, and the acquiring firm forms an alliance for internationalization.

Leveraging the panel data, the quantitative evidence depicts whether and how the pioneering firms classified above were associated with subsequent launches of mobile money platforms in other countries.[4] To do so, we examine whether a pioneering firm participated in launching at least one subsequent platform in another country as well as the number of subsequent platforms associated with a pioneering firm over time in other countries.

Business History Analysis: We use the primary and secondary textual accounts to construct business histories for each pioneering firm, with a focus on identifying common patterns of capability development and deployment within firm types that underlie whether and how the pioneering firms engaged in internationalization. These patterns emerge from several iterations of sifting through historical records. We first worked primarily with data on firms that have detailed first-person accounts of events and their causes—such data consist of in-depth interviews with key executives or first-person accounts written by those executives. We then expanded to all available data on all firms (albeit less complete) to determine whether they provided supportive or conflicting evidence.

To explicate the analysis, we provide illustrative business histories that focus on reasons for launching a mobile money platform, capabilities deployed for the pioneering launch, and subsequent capability development, reconfiguration and creation for internationalization. We then show consistency with other firms within each type and crystallize the critical mechanisms that underpin

[3] While some followers engaged in international expansion by acquiring existing firms as the industry grew, none of our pioneering firms engaged in this strategy.

[4] We use descriptive tables and figures with associated confidence intervals to present our quantitative evidence. Results are consistent with more formal analysis utilizing QCA or multinomial logit, available from authors upon request.

the choices of internationalization strategies. Finally, we examine the counterexamples—pioneering firms that *did not* engage in international expansion—to understand why this was the case.

ANALYSIS AND FINDINGS

In this section, we begin with classifying pioneers based on their location and initial characteristics, and examining the propensity of internationalization in each category. We then focus on the subset of pioneers that chose to internationalize to define three types of firms—labeled as Goliaths, David 1s, and David 2s—and their pathways for internationalization. Next, we use illustrative business histories and corroborative evidence on all other internationalizing firms within each firm type to dig deeper and illuminate core points regarding development and deployment of specialized capabilities. In the final sub-section, we document the industry impact of each of these pioneering firm types in terms of global diffusion.

Classification of Pioneers and the Propensity of Internationalization

The mobile money industry features 31 pioneering firms that introduced 30 mobile money platforms across eight developed and twelve developing countries, with a mean of 1.5 and a mode of 1 pioneering platform in each country. Table 1, Panel A, classifies the pioneering firms based on the three main firm characteristics described above: startups vs. diversifying entrants, multinationals vs. single-country firms, and initial platform launch in developed vs. developing countries. Table A1 in the online appendix provides further detail on each pioneering firm such as the year, country, and name of the pioneering platform launch.

Not all pioneering firms engage in internationalization. Pioneering firms that do are listed in bold in Table 1, Panel A, and the corresponding propensity of internationalization across cells is documented in Panel B. Forty-two percent of mobile money pioneers launched at least one subsequent platform in another country, but this average statistic masks important differences across our baseline categories. Specifically, only 35 percent of diversifying entrants compared to 50 percent of startups internationalize. For the diversifying entrants, the lower levels of internationalization are driven by pioneers that are in single countries (none of them internationalize); while, 86 percent of the multinational diversifying entrants internationalize (67 percent that launched in developed

countries, and 100 percent that launched in developing countries). For startups (all in single countries), the propensity to internationalize is 50 percent; moreover, only 40 percent of developing country startups internationalize compared to 75 percent of developed country startups.

From here, we focus on the subset of pioneers that internationalize, and create a typology for pioneering firms *that engage in internationalization.*[5] Among these internationalizing firms, we refer to the multinational, diversifying entrants as *Goliaths* (see bolded firms in Cells 1a & 1b); developed country startups as *David 1s* (see bolded firms in Cell 4), and developing country startups as *David 2s* (see bolded firms in Cell 5). There are six Goliaths, three David 1s, and four David 2s.

[Insert Table 1 here]

Business History Analysis of Pioneering Firms

We analyze the business histories of pioneering firms to better understand how capabilities were created and how they contributed to the distinct expansion outcomes observed. We begin by describing commonalities in the internationalization strategies of each firm type. We then dig deeper into the business histories of the Davids and Goliaths to document similarities within firm type with respect to underlying capability development and deployment. We also examine the business histories of the 18 firms that do not internationalize; they serve as valuable counterexamples that help shed light on whether the reasons are consistent with patterns related to the scale and scope of their capabilities.

Internationalization Strategies

Figure 2 summarizes each firm type's internationalization strategies. Goliaths, as multinational mobile network operators, had downstream assets and access to an established customer base, and they mostly leveraged these capabilities to conduct internal expansion (though in just a few cases, they engaged in alliances with other mobile network operators where they lacked

[5] Though symmetry may suggest we distinguish between multinational diversifying entrants based on platform launch location (developed or developing) just as we do for startups, we refrain from doing so for several reasons. One, many of these multinationals had pre-existing downstream presence in mobile networks across developing and developed countries. Two, as seen in Table 1, the differences in propensity of internationalization across country of launch for multinational diversifying entrants is not as stark (driven by just one multinational diversifying entrant that did not internationalize). Three, as discussed later in the business history analysis, the underlying factors related to scale and scope operate similarly for both types of multinational diversifying entrants.

such presence). All but one of them (see Table 1 Panel A) chose to source complementary upstream technology capabilities from another firm rather than develop those capabilities in-house.

Both David 1s and David 2s possessed technological capabilities, but their strategies diverge from there. David 1s focused on developing a mobile operator-agnostic "universal" platform and continued with the intent to reach customers across the globe, until each was acquired. Their acquirers repurposed David 1s' capabilities to focus on upstream technological assets, utilizing them to engage in alliances with partners that possessed downstream capabilities. David 2s engaged in alliances with a mobile network operator for complementary downstream assets and customer access right from the beginning, and they (and their acquirers) continued this initial strategy to engage in internationalization through alliances.

[Insert Figure 2 here]

Digging Deeper: Uncovering the Role of Scale & Scope in the Development and Deployment of Knowledge and Capabilities for Internationalization

In what follows, we begin with an illustrative business history of a Goliath, a David 1, and a David 2 to understand how underlying capabilities created the above differences between their internationalization strategies. We then provide evidence to confirm the patterns are not idiosyncratic to a single firm, but representative of pioneering firm types. Additionally, we examine the business histories of pioneers that did not internationalize.

Brief History of a Goliath (Vodafone):

Vodafone, a multinational telecommunications firm headquartered in the United Kingdom launched its first mobile money platform—M-PESA—in Kenya in 2007 through its partial subsidiary Safaricom. Shortly after joining Vodafone in 2001, executive Nick Hughes envisioned Vodafone engaging in poverty reduction, a UN Millennium Development Goal (Hughes and Lonie, 2007: 65). With partial support from the U.K. Department for International Development in 2003, Hughes championed M-PESA within Vodafone and recruited another executive Susie Lonie to travel and work within Safaricom in Kenya (led by CEO Michael Joseph). Initially, Vodafone thought it would make sense to buy an off-the-shelf software. However, it soon became apparent that such software "*had all been designed with Western banking infrastructure as the point of reference*" (Lonie

in Hughes & Lonie, 2007: 69), *"and therefore the functionality and experience of these products would not be suitable for M-PESA*" (IFC, 2009: 4). So Vodafone formed an alliance with U.K.-based technology company Sagentia for upstream technological capabilities that would capture to unique needs of the unbanked, requiring the ability to "*operate in the absence of a consumer bank account and a consumer interface…compatible with the most basic of phone models"* (Lonie in Hughes & Lonie, 2007: 69).

While interfacing with Sagentia for technology development, Vodafone focused on deploying downstream capabilities. This required understanding and accommodating customer needs. Here, while Hughes' initial value proposition for M-PESA was to facilitate entrepreneurship through microfinance loan repayments, the pilot program resulted in the realization of the bigger value proposition of person-to-person remittances. Joseph (2017) said: "*we had inadvertently identified one of Kenya's biggest financial challenges… What we found in practice was that people who received the loans were sending the money to other people hundreds of miles away.*" The re-designed M-PESA used the slogan "*Send Money Home.*" Customer needs also drove efforts in platform design for functionality and technology interface. As Lonie noted: "*We also learned to keep it simple. When it came to moving from pilot to live system, a significant amount of the complexity in the product was stripped, allowing Safaricom to go to market with a very simple consumer proposition*" (Hughes & Lonie, 2007: 80). Moreover, M-PESA's launch required developing and training a robust agent network. M-PESA leveraged the already established network of airtime dealer outlets. Existing agents—"*'mom and pop' stores more used to selling goods than receiving and handling cash from their customers*"—were recruited and trained, as were local Kenyans in rural areas who saw the business opportunity to serve as M-PESA agents (Joseph, 2017).

Encouraged by its resounding success in Kenya, Vodafone launched a replication model of M-PESA in Tanzania through its subsidiary Vodacom in 2008. However, critical economic and socio-cultural differences between the two neighboring countries immediately presented numerous unanticipated challenges. In particular, the "*Send Money Home*" campaign did not resonate in Tanzania, absent a dominant urban to rural remittance pattern (Camner, Sjoblom, and Pulver, 2009). Also, relative to Safaricom's 1,000+ retailer network, Vodacom had only six national retailers. The challenge of building on existing networks was further exacerbated by fewer resource investments in

recruiting and training agents. When coupled with a more competitive landscape in mobile money (Camner *et al.*, 2009), initial adoption in Tanzania was well below expectations: "*After fourteen months, M-PESA in Tanzania had only 280,000 users...at about 930 agent locations…compared to the 2.7 million users and 3,000 agents registered in Kenya 14 months after local launch*" (IFC, 2010).

Recognizing that a replication model did not address idiosyncratic and context-specific user needs that differ by country, Vodafone adapted its strategy in Tanzania. It re-engaged with its learning-by-doing model employed in Kenya and relaunched M-PESA in Tanzania in 2010. The re-launch featured a new marketing campaign tailored to Tanzania's customer needs (*e.g.*, utility bill payments and loan repayments) and investments in the creation of aggregator agent network. The number of registered users more than doubled one year later (Vodacom, 2014).

Post 2007, Vodafone built on the above insights and kept developing its knowledge of country-specific user needs by learning to anticipate specific challenges in each new country due to unique customer needs. This may in part be a reason for their decision to integrate technology development in-house in most new platforms, as a reversal of its original approach. In Afghanistan, for example, Vodafone "*envisaged that our mobile money transfer would develop differently in each new market according to the requirements of that country*" and also used the launch to experiment with an interactive voice recognition system to enhance M-PESA's offerings (Vodafone Group, 2014). Between 2007 and 2017, Vodafone launched mobile money platforms in 15 countries: 11 were through internal expansion, and 3 were alliances with local mobile network operators (MNOs) given Vodafone's lack of mobile operations in those countries.

Brief History of a David 1 (Obopay):

Obopay was founded by Carol Realini, a U.S.-based serial entrepreneur. As with Hughes in Vodafone, at least part of her motivation was to help with poverty alleviation. During a trip to the Democratic Republic of Congo (DRC), Realini observed "*the poverty and unwieldy payment system…[and] had an epiphany: mobile banking was the key*" (Prows, 2010). From the outset, Obopay pursued a go-at-it alone strategy via internal expansion. It launched initially in the U.S. in 2005, but with a vision of creating a global, flexible mobile money platform for broad and interoperable (across carriers and

handsets) access, and across developing and developed countries alike (Prows, 2010). "*From the beginning, we decided that, to … deliver financial services to every mobile phone, we had to be willing to build a service that could work in places like the U.S., as well as India. …That was a very tough [and] very expensive decision, and it requires the ability to execute on two different markets*" (Sanders and Nelson, 2009).

For its pioneering platform launch, Obopay deployed technological capabilities in systems integration. Per Realini: "*We built the backend and the front end technologies. We brought together mobile engineers and payment engineers and told them to build a technology platform and the applications on top of it. They did not know how to talk and understand each other and one of the biggest challenges was just getting people to understand each other. We were able to accomplish that*" (Mitra, 2008). Obopay created an exclusive partnership with Mastercard and also enabled linkages to bank accounts, the idea being that "*banks are the best channel to reach consumers and reach merchants*" (Prows, 2010). Obopay also marketed itself as 'social money' for settling debts among friends and families, and pursued small business owners (Wolfe, Fitzgerald, and Holland, 2018).[6]

These capabilities turned out to be less useful than envisioned. Rapid technological changes rendered many features of Obopay's system-integration capabilities obsolete. "*Obopay's service could be used by sending text messages or using special software built for the so-called feature phones that predate smartphones. Those systems were rendered obsolete by the launch of the iPhone app store*" (Wolfe *et al.*, 2018). Moreover, Obopay did not gain much traction with U.S. consumers. For example, small business owners failed to see Obopay's value proposition, given per transaction fees of 25 cents and a 1.5% "stocking" fee (Benson, 2009). Notably, even though it did not market directly to the underbanked in the U.S., this segment made up a quarter of Obopay's user base by mid-2007.

Obopay launched subsequent platforms in three developing countries—India (2008), Kenya (2009), and Senegal (2010). Here, Obopay's system integration capabilities received recognition as "*the only financial services provider to be named Technology Pioneer 2010 by the World Economic Forum for its innovation and transformational technology*" (PR Newswire, 2009). Nonetheless, country differences in

[6] In theory, small business owners who did not want to pay for a credit card terminal and associated fees and currently took cash or check payments could receive a transfer from customers with an Obopay account. (Benson, 2009).

banking regulations created hurdles and required changes to Obopay's core product offering. Facing severe liquidity crunch and realizing that it needed more than superior technology capabilities to adapt to different market contexts and to gain downstream customer access, Obopay sought to engage in alliances and raise funds through partners. Along with efforts to co-brand Yu in Kenya with a local mobile phone service, and a partnership with a large French bank Société Générale in Senegal, Obopay partnered with mobile phone maker Nokia to launch Nokia Money in India. Nokia invested $35 million in Obopay by acquiring a 38% stake in the company (Cain Miller, 2009).

However, this decision came rather late, and more importantly, Obopay had not developed problem-solving capabilities to address user- or partner-specific needs. Here, the alliance forged with Nokia turned out to be a damaging decision. As a mobile phone maker rather than a network operator, Nokia itself had no downstream assets and access to customer base. As a result, Realini noted in an interview that Nokia Money became "*a managed service offered by a bank*" (Mitra, 2008), a far cry from a value proposition that would appeal to the unbanked. Soon, Nokia's own unrelated financial troubles resulted in its decision to divest its fintech business, forcing Realini to sell the company's assets (Krishna, 2017). Those assets were bought by two Indian entrepreneurs previously employed by technology giant Infosys. New CEO Shailendra Naidu noted, "*The business had potential because the technology was there to ramp up any form of fintech service for a financial institution wanting to enter the digital world*" (Krishna, 2017). The Obopay name was retained, but the customer-facing capabilities were shed and the reconfigured technological capabilities were utilized to engage in alliances with downstream partners to launch ten mobile money platforms in seven developing countries.

Brief History of a David 2 (Fundamo):

When assigned the task of scouting for new internet-enabled businesses, CIO Hannes van Rensburg at Sanlam, South Africa's second-largest life insurance company, became "*convinced that we had to innovate around the new platform called mobile phones…[for] solutions to benefit lower-income people by creating a better and more efficient financial system*" (van Rensburg, 2016, location (hereafter l.) 313). The idea was deemed too far from Sanlam's core business, so van Rensburg quit to found Fundamo in 2000. As in the above two cases, Fundamo's choice to enter in Africa was tied to van Rensburg's

desire to benefit low-income people. With the vision of allying with multiple partners to build multiple platforms, Fundamo chose to focus on developing technology and created pilots to convince existing mobile network operators to run a mobile money platform.

Fundamo deployed its technological capabilities through its first pioneering platform (called Celpay) launch in Zambia in 2002 with alliance partner Celtel (formerly known as MSI), a multinational mobile network operator, founded by an entrepreneur (Mo Ibrahim) himself hailing from Africa and with keen interest in poverty alleviation. Fundamo gained valuable experience in managing complex systems and real time problem solving, a capability that would repeatedly prove useful: *"there is a big difference between demonstrating a system in a pilot environment and rolling it out in a real enterprise solution. We struggled with many things—things that we could just not get to work properly. … It felt virtually impossible to get the total system to work coherently*" (van Rensburg, 2016, l. 1023). In the subsequent pioneering launch of Celpay in the DRC, Fundamo developed capabilities for adapting to local contexts and regulatory structures. For example, the lack of unique identifiers for DRC citizens required Fundamo to create additional verifications and controls for opening payment accounts.

By 2006, Fundamo had launched a third pioneering platform in South Africa with MTN (a South Africa-based Goliath). By that time, according to van Rensburg, Fundamo already "*knew the industry very well and knew there was nothing as rich in functionality, or with the same level of technological sophistication, out there*… [But they still] *naively thought that a good, proven product was all we needed to be successful*" (van Rensburg, 2016, l. 2097). The realization that a good product was not enough by itself was hammered home in a stinging rebuke from MTN's director Irene Charnley who bluntly told Fundamo leadership that MTN was "*not happy and wanted us to improve our delivery and support*" (van Rensburg, 2016, l. 2142). In response, Fundamo had to develop additional capabilities to create consistent delivery and support structures by enacting several organizational changes, including "*restructure[ing] our staff and dedicate[ing] some to exclusive MTN support…. regular reviews and feedback sessions... measure[ing] the number of incidents that arose and how quickly we fixed them*" (van Rensburg, 2016, l.

2142). The efforts paid off, and Fundamo and MTN continued to engage in multiple alliances for subsequent (post 2007) platform launches.

Importantly, even as Fundamo leveraged the dyadic relationships with MTN and Celtel to expand to several countries in Africa, it forged alliances with eight new partners to expand across West and South Asia. Those partners were not limited to multinationals (*e.g.,* Vodafone in Qatar), but also included banks (*e.g.,* Bank Sinar in Indonesia) and single-country mobile network operators (*e.g.,* Warid Telecom in Pakistan). Through these multiple and diverse alliances, Fundamo further developed its capabilities for managing complexity, problem solving, adapting to local systems, and flexible organizational structure, and those capabilities became invaluable in platform launches with even more alliance partners. For example, the ability to manage complexity paid off on the night of Easypaisa's launch (with alliance partner Telenor) in Pakistan: "*tens of thousands of customers tried to use the system… Usage peaked way above the point we had expected… Everything collapsed. …* ***Luckily, we had been here before with many, many systems [emphasis ours]*** *… By the end of the day, the system was sufficiently tuned to run largely unattended… Today, Easypaisa is one of the best-known brands in Pakistan*" (van Rensburg, 2016, l. 3053). van Rensburg also credits Fundamo's ability to repeatedly problem solve: "*This was one of the reasons why the company could grow in markets in which others struggled: Fundamo staff made things work, even under the most challenging situations*" (van Rensburg, 2016, l. 1230). Similarly, Fundamo understood that "*banking regulations and infrastructure differed significantly from one country to the next*" (van Rensburg, 2016, l. 2710). A continued focus on building a flexible, adaptable organizational structure to balance between customization and standardization enabled rapid growth: "*each country was run autonomously. While the group could negotiate favorable deals, individual countries could decide to make their own technology decisions. This required a renewed sales effort for each new country…After careful planning—with a lot of emphasis on standardization… we felt confident*" (van Rensburg, 2016, l. 2710).

By 2011, Fundamo had helped launch over 50 active platforms across 40 countries, including 27 countries in Africa, Asia and the Middle East (Thomas, 2015). Such success culminated in an acquisition by VISA, with van Rensburg continuing at the helm (Maota, 2011). VISA recognized Fundamo's technological capabilities and reach to millions in developing markets with mobile

phones, but without credit cards (van Rensburg, 2016, l. 4100). From Fundamo's perspective, van Rensburg aspired for continued growth by leveraging VISA's network of interoperable payment points to compete successfully against later entrants such as SAP. He stayed with Visa until retirement through late 2014, to help realize these aspirations through the creation of the mVisa interoperable payment service. By 2017, mVisa services had rolled out in 10 different countries (Business Wire, 2017), resulting in "*60 million more consumers to make digital payments on their mobile devices*" (PYMNTS, 2016).

Role of Scale and Scope in Internationalization by Pioneering Firms

We now turn to examining the consistency of the above illustrative histories with the lessons from business histories of other pioneering firms to elucidate common patterns in the role of scale and scope. Additionally, we examine the extent to which the *absence* of scale or scope may be at play in the business histories of firms that chose not to internationalize (see Tables A2 and A3 in the online appendix for extensive documentation).

Goliaths: As well-established multinational firms, the Goliaths had strong mobile network operating capabilities, and held dominant market shares of the existing user base in their countries of expansion. The evidence in Table A2 in the online appendix shows that the illustrative pattern for Vodafone also holds for Celtel, MTN and True. Specifically, all but one Goliath launched their pioneering platforms by leveraging their scale of downstream mobile network capabilities to support existing customers and gain new customers, but sourced upstream technological capabilities from another firm. When engaging in internationalization, the Goliaths continued with the same strategy—they leveraged their scope of multinational operations in the form of their own mobile networks in other countries, focusing on *developing* rather than developed countries. Additionally, two Goliaths (Vodafone & Sonera) made limited use of alliances with other mobile network operators to launch mobile money platforms in countries where they lacked a presence.[7]

[7] Interestingly, Sonera's use of alliances (not internal expansion) is actually consistent with underlying scale and scope considerations. Sonera was the first among the pioneers in launching mobile money, and it did so by developing the technology in-house. However, Sonera's scope of mobile operations was in developed countries, so its (limited) internationalization was by providing its technology to a mobile network operator in Thailand.

Notably, three of the Goliaths launched their mobile money platforms in alliance with a David 2 (Fundamo in cases of Celtel and MTN, and Utiba in the case of True). By relying on David 2s as partners, these Goliaths were able to circumvent the challenges in adaptation to country-specific user needs that were encountered by Vodafone in Tanzania (see the discussion of Fundamo above). Indeed, such a partnership enabled MTN to achieve more rapid internationalization than Vodafone. We further discuss the implications of these partnerships between Goliaths and David 2s below when examining quantitative evidence of the industry-wide impact of each firm type.

In summary, the Goliaths (multinational mobile network operators that successfully internationalized their mobile money offerings) relied on both the scale and scope of their downstream capabilities (the scale of mobile network client base in each country and its scope across countries). They mostly relied on alliance partners, notably on David 2s in terms of not just upstream technological capabilities but also (and more importantly) in terms of problem-solving and adapting mobile money platforms to the demand and general environment in each new location.

David 1s: As startups in developed countries, David 1s' founders tended to be veterans of associated industries, including traditional banking and software consulting. The evidence in Table A2 shows the illustrative pattern for Obopay also holds for Monitise and Paybox. Specifically, David 1s relied on their robust technological capabilities to first launch platforms in developed countries with stable banking, regulatory, and technological infrastructures. All of them experienced challenges in securing downstream customer bases, and failed to realize the potential scale of a universal platform they had envisaged. Their efforts at international expansions (across both developed and developing countries) were further hampered due to dwindling resources and lack of demand. In developed countries, David 1s struggled to convince customers to use their services given well-established personal banking infrastructures, while in developing countries, context-specific regulations and user needs resulted in slow and haphazard development of problem-solving capabilities. In the end, the failing David 1s were acquired for their technological capabilities (their customer-facing platforms were discontinued). In two of the three cases (Obopay and Paybox), the acquirers redeployed David 1s' technological capabilities to engage in alliances and build mobile

money platforms for downstream providers (Monitise's acquirer redeployed the technological capabilities for digital banking and e-commerce). Such a shift of strategy enabled those acquirers to engage in significantly more internationalization than what the David 1s had been able to achieve (see Table A2 in the online appendix).

To summarize, David 1s (startups in developed countries) attempted to develop both upstream and downstream capabilities at the same time, while largely oblivious to the necessity to adjust to specific contexts and very different demand patterns from clients in developed and developing countries. As a result, these firms suffered because they neither possessed the scope of downstream presence of the Goliaths, nor did they develop the generality and flexibility of the David 2s to enable scale in internationalization.

David 2s: As startups that launched their initial platforms in a developing country, David 2s critically did not attempt to sell directly to customers. The evidence in Table A2 shows the illustrative pattern for Fundamo holds for Comviva, Utiba, and Wizzit. Specifically, all David 2s focused on creating upstream technological solutions and problem-solving for multiple challenges in their pioneering launches: these included overcoming country-specific institutional, regulatory, and infrastructure issues, and developing alliance capabilities to trade with mobile network operators that sourced their capabilities. Subsequently, David 2s expanded scope of operations to other developing countries through alliances with partners that had downstream scale in terms of mobile network presence. David 2s did so by "specializing in generality"—they developed and deployed bundled knowledge capital consisting of three capabilities that built on each other. First, they deployed initial upstream technology assets and were able to focus their efforts on creating technology solutions for developing countries that could be sold in intermediate markets to MNOs for downstream commercialization. Second, they developed flexible and adaptive problem solving capabilities to accommodate diverse consumer needs and regulatory environments of different countries. Third, they developed alliance management capabilities that generalized beyond dyadic relational capital to increasingly work with new mobile network operators as downstream partners.

To sum up, then, David 2s (startups in developing countries) gained access to scale by forging alliances with mobile network operators and/or banks that possessed downstream client bases. Unconstrained from being locked-in to its own customer base, David 2s were able to achieve the scope through multiple such alliances. This strategy enabled David 2s to overshadow internationalization efforts by other pioneering firm types, as described in more detail below.

Counterexamples: Role of Scale and Scope in Non-Internationalization by Pioneering Firms

As indicated in Table 1, Panel A, not all pioneers expanded internationally, and we examine patterns for why this was the case (see Table A3 in the online appendix). Within Cell 1 of Table 1, Panel A, (multinational diversifying entrants), Sony is the only pioneer that was *not* a mobile network operator, as it provided technological expertise to alliance partner NTT DoCoMo (a Goliath). Thus, it lacked the scope of relevant downstream presence in other countries.

Cells 2 and 3 of Table 1 consist of ten single country diversifying entrant pioneers. Mobipay (Cell 2) represented an alliance of multiple mobile network operators and banks for a pioneering platform launch in Spain. Mobipay failed due to lack of robust demand in a developed country, coupled with the inability of the partners in a multi-firm alliance to create incentive-compatible coordination mechanisms. Two of the firms in Cell 3 (diversifying entrants in single developing countries) were *not* mobile network operators. Sagentia provided upstream technological capabilities to Vodafone (a Goliath), and Yandex is a large Internet services firm in Russia. Among the seven mobile operator firms, one firm—Oi (formerly Telemar Norte Este) in Brazil—discontinued its platform after filing for bankruptcy. The other six firms continued to scale their within-country operations to successfully cater to existing and new customers' unmet needs for financial access through their platform launches. Thus, a common theme in this cell is that while some were able to leverage scale within a single country, all lacked the scope of downstream multinational presence, resulting in no internationalization.

Within Cell 4 of Table 1 (developed country startups), Mint launched its platform in Sweden for limited traction in the city of Stockholm, but could not even scale to the rest of the country. It was acquired for its technological capabilities similar to the David 1s in Cell 4, but the acquiring firm

focused its scope to Sweden alone to scale and transformed Mint into a mobile-enabled parking solution application. Finally, six of the developing country startups (Cell 5) did not internationalize. Three of these—mCash, Paggo, and Suvidha—terminated their mobile money platform operations even in their first country of launch (See Table A3 in the online appendix for reasons why). The other three continued to grow in their countries of launch. These firms focused efforts on increasing their within-country scale and addressing challenges created by their resource constraints, rather than attempting to forge alliances for internationalization scope.

Global Diffusion of Mobile Money Industry: Relative Impact of the Davids and Goliaths

We now turn to quantitative evidence of the global mobile money industry-wide impact of Goliaths, David 1s, and David 2s. Consistent with Figure 1, Table 2 shows the number of (follower) mobile money platforms worldwide increased steadily from 2010-2016, with a tapering off in 2017. In 2010, 45 percent of all follower platforms represented internationalization by the pioneers. Even as the industry grew rapidly through entry by imitators, the fraction of follower platforms associated with pioneers in each year remained in the range of 30 to 40 percent. Table 2 additionally distinguishes among follower platforms associated with each pioneering firm type. The number of follower platforms associated with each pioneering firm type steadily increases over time, but the levels are strikingly different. David 1s had the least, and David 2s had the highest impact. Goliaths fall in-between the two. Taken together, the impact of both Davids is about three times larger than that of the Goliaths throughout the sample period, and David 2s alone account for about twice as many subsequent platforms associated with them as the Goliaths and David 1s combined.

In Figure 3, we depict the fractions of follower platforms associated with Goliaths, David 1s, or David 2s in the total number of new platforms associated with all pioneering firm types year by year. That is, for each year, we compute the number of follower platforms associated with a Goliath, David 1 or David 2 and divide it by the number of follower platforms associated with all pioneering firm types. As Figure 3 reveals, despite being just four out of 13 internationalizing pioneers, David 2s on average account for over 70 percent of all follower platforms associated with pioneers, and are clearly in their own category as can be seen by non-overlapping confidence intervals (except for

2011).[8] Thus, David 2s' specializing in generality strategy, buttressed by bundled knowledge capital, had the largest impact in terms of global diffusion.

[Insert Table 2 and Figure 3 here]

As noted in the business histories section above, several pioneering platforms were launched through joint alliances between a Goliath and a David 2. This dyadic relationship between the two pioneering firm types continued during the industry expansion phase but underwent significant changes over time. In Figure 4, we focus specifically on follower platforms that involved either a Goliath or a David 2 (or both) and plot the shares of follower platforms where a Goliath and a David 2 were involved, either in a joint alliance with each other, or without such an alliance with each other. To be precise, for each year, we compute the number of follower platforms associated with a David 2 or a Goliath with or without the other pioneering firm type as a partner and divide it by the total number of follower platforms launched in that year that were associated with at least one Goliath and/or a David 2. It can clearly be seen that early on, joint alliances between a Goliath and a David 2 accounted for about 30 percent of follower platform launches in which either of them participated. This evidence is consistent with the role played by the dyadic relationship (such as the alliance between Fundamo and MTN described above) in early capability development of both firm types. However, each increasingly ventured without the other over time, and the share of joint alliances eventually decreases to less than 10 percent of platform launches associated with these pioneering firm types.

In terms of alliances with a non-pioneering firm partner, Figure 4 shows very starkly that David 2s do so predominantly and from the onset; this trend only increases over time. Most of these alliances were forged with new multinational mobile operators that sought entry into the industry; others consisted of alliances with single country mobile operators or banks. Thus, as is already reflected in Fundamo's business history, David 2s leveraged their bundled knowledge capital actively to expand and diversify the set of their alliance partners, and pursued a specializing in generality strategy. The Goliaths, on the other hand, have a smaller fraction of alliances without a David than

[8] Note that the totals in Figure 3 exceed 100 percent because multiple pioneers may be involved in the same platform.

with from the onset, and this fraction reverses around 2014. In part, this is also because they begin to enter into alliances with mobile network operators in countries where they do not have a downstream presence to leverage their mobile money specific knowledge capital.

[Insert Figure 4 here]

The total cumulative impact of pioneering firms in terms of countries where mobile money industry diffused is described in Table 3. Consistent with the above trends of follower platforms associated with the Davids and Goliaths, the impact of all the pioneering firms (without double counting) is in the range of 45-70% of countries with mobile money. Importantly, towards the end of the period, David 2s' impact is almost twice that of the Goliaths. When taken together, by 2017, the David 1s and 2s had diffused to 67% of the countries with mobile money; while, the Goliaths were present in only 26% of such countries. Such impact is also observed in Table 4, which tabulates the six leading global mobile money platforms as of 2017 based on the number of countries where they were deployed. Altogether, these six leading mobile money platforms account for 76 country-platforms, representing more than a quarter of all live platforms worldwide. All six are linked to the pioneering firms. Two of these global platforms are linked to internal expansion or alliances by Goliaths and the other four are linked to alliances by David 2s. Here too, David 2s dominate internationalization relative to the Goliaths.

[Insert Tables 3 and 4 here]

DISCUSSION

Our study examines the microfoundations of an industry's global diffusion and sheds light on whether and how pioneering firms deployed and developed capabilities to pursue different internationalization strategies. It highlights that the Goliaths—pioneering multinational diversifying entrants that engaged in internationalization are overshadowed by the Davids—pioneering single country startups that engaged in internationalization, particularly those startups that launched platforms in developing countries. This finding runs contrary to received wisdom in both industry evolution and international business literatures, where lack of scale, ownership of complementary assets, and downstream capabilities constrains startups relative to diversifying entrants (Helfat and

Lieberman, 2002; Mitchell, 1991) and large multinationals (Fitzgerald, 2009; Kleinschmidt, 2011; Govindarajan and Ramamurti, 2016). The quantitative and business history analysis provides important insights on why this is the case. In conducting a deep-dive into whether and how pioneering firms deploy and develop capabilities for internationalization, we extend scholarly work examining scale and scope dynamics in three related, yet distinct ways.

First, we corroborate Smith-Stigler-Rosenberg emphasis on specialization, even as we find that it manifests in a very different way in a digital innovation based industry than in traditional, physical capital goods industry settings. In Rosenberg's (1963) framework, the lack of division of labor in the (physical) capital goods sector in developing economies reduced economies of specialization—essentially, you cannot start a (physical) capital good industry unless you already have it! However, global reach of the Internet and mobile infrastructure has enabled the emergence of new industries based on digital technologies, and this suggests that developing countries are primed to contribute far more to the development of new industries than they did in the past. Indeed, when the key specialized asset is not physical capital, but "bundled knowledge" capital—the synthesis of technological, user-specific needs and alliance management knowledge—firms in developing economies are able to partake in the creation and global diffusion of an industry.

Second, we find support for the distinction between scale and scope economies when examining strategic decisions for growth and expansion, even as industry-level impact can vastly differ as firms leverage different specialized capabilities. Specifically, multinational diversifying entrants exhibit the highest propensity to internationalize (*i.e.,* become Goliaths), but single country diversifying entrants do not internationalize at all. And while the Goliaths of our study do indeed achieve significant success by leveraging both within-country scale economies and across-country scope to lower the marginal cost associated with each particular application (Bresnahan & Gambardella, 1988), for the most part, they are limited in scope by countries where they already have a downstream presence. In contrast, even though the David 2s represent the lowest propensity of internationalization (among the cells where we observe internationalization), their global impact is the highest. Here, we find support for the budding literature on specializing in generality: "*when*

downstream firms spread across several markets and, thus, the intermediate demand becomes broader, investing in generality might be convenient for both firms trading and those entering downstream" (Conti *et al.*, 2019: 132). The David 2s in our study exploit the same reduction in the marginal cost of serving different applications as the Goliaths, but they also have the ability to increase the scope of those applications virtually without limit. Put simply, the capabilities developed by David 2s were ultimately not "tethered" (both from country-specific downstream client bases and from the need to integrate such customer bases into the platforms they helped provide). Importantly, their "trading in intermediate markets" is not merely based on licensing of upstream technology (Conti *et al.*, 2019; McGahan & Gambardella, 2010). Specializing in generality required the David 2s to develop and deploy bundled knowledge capital which combined technological and "demand-side" capabilities—the latter included the ability to discern and address commonalities and differences in country-specific institutions and user needs, and to address partner-specific needs in management of alliances. The importance of such bundled knowledge capital is further illustrated by the fact that whenever the Goliaths ignored its importance, their efforts were not as successful. As with Vodafone above, they had to reconfigure and adapt their downstream assets to country-specific contexts.

Third, we find support for the fact that pioneering startups that attempt to integrate upstream and downstream activities are disadvantaged relative to pioneering diversifying entrants (Klepper & Simons, 2000; Ganco & Agarwal, 2009), even as we find that pioneering startups that leverage collaborations have the highest industry-level impact. In doing so, our results qualify the assumption in most industry evolution studies that pioneering startups need to *compete* against pioneering diversifying entrants (Bayus & Agarwal, 2007; Klepper & Simons, 2000; Mitchell, 1989). Alliances forged by David 2s and Goliaths enabled them to not only leverage relational capital with each other, but also to develop more general alliance management capabilities to pursue alliances with later entrants in the industry. Importantly, the *global* scope of the industry minimized the competitive dynamics between the David 2s and the Goliaths, as each could leverage their capabilities in distinct and non-overlapping downstream markets represented by each country. The positive spillovers are evidenced by the swift diffusion of the industry world-wide, for the

satisfaction of unmet needs in developing countries first and foremost through provision of financial access to the unbanked population.

Limitations and Future Research

We note several limitations to our work. First, like many industry evolution studies, ours is a single-industry case study. Because few globally born industries have emerged, opportunities for multi-industry analysis are still limited. We hope our study is only the first among many others that build a knowledge base and examine which findings replicate, and which ones are contextualized.

Second, we note that at the *industry level,* the David 2 strategy of specializing in generality emerged as the most impactful in terms of global diffusion. However, at the *firm* level, our study is only able to examine performance based on whether the firms engaged in international expansion. While internationalization efforts (and the underlying capabilities and strategies utilized by pioneers that choose to do so) are interesting in their own right, we are unable to inform the question of whether Goliaths had higher or lower profitability than the David 2s. Similarly, it may well be the case that pioneers that survive and choose to remain in their initial country of launch are just as (or even more) successful than pioneers that internationalized on metrics associated with revenue and profitability. We leave these issues to future research.

Future research may also compare among strategies for international expansion in industries based on innovations catering to unmet needs in developing countries (*e.g.*, mobile money) to those strategies in industries catering to unmet needs common across developing and developed countries (*e.g.*, smartphones). Alternatively, comparative studies may examine differences in internationalization strategies in industries where platforms enable firms to ally for upstream and downstream capabilities to provide products and services (*e.g.*, mobile money) to industries where platforms enable two-sided markets between providers and consumers (*e.g.*, ride sharing platforms). Within the entrepreneurship literature, our paper provides "proof of existence" of developing country startups that utilize alliances for internationalization, but much work remains for theory building regarding their challenges and opportunities, and the capabilities and strategies critical for pursuing these strategies.

CONCLUSION

The mobile money industry is a striking departure from "trickle down" models of industrial development that suggest industries will first emerge in developed countries and diffuse to developing countries as processes become standardized. Instead, the industry is better described as an industry that was "born global" and in which knowledge trickled "every which way." The benefits of this pattern of industrial emergence and growth in the context of mobile money were immense: democratized and distributed innovation tailored to the needs of consumers across economic spectrum and across the globe. We thus join others who have observed phenomena such as technological leapfrogging in suggesting that innovation can truly stem from anywhere.

Our knowledge of this novel pattern of industry emergence is preliminary, and many questions and issues remain to be explored. In this paper, we investigated issues pertaining to international expansion and the development and deployment of capabilities from pioneering firms. We found three types of pioneering firms—David 1s, David 2s, and Goliaths—internationalize in different ways. Strikingly, David 2s (developing country startups) had a greater global footprint than both David 1s (developed country startups) and Goliaths (diversifying entrant multinationals), even though conventional wisdom might predict the greatest success for the latter two types of firms. We link such impact of David 2s to their choice of specializing in generality by developing and deploying bundled knowledge capital, including capabilities related to technology, problem solving and alliance management, that could be leveraged in multiple countries. Not only did these firms grow through collaboration, they created and democratized access to needed financial products and services worldwide.

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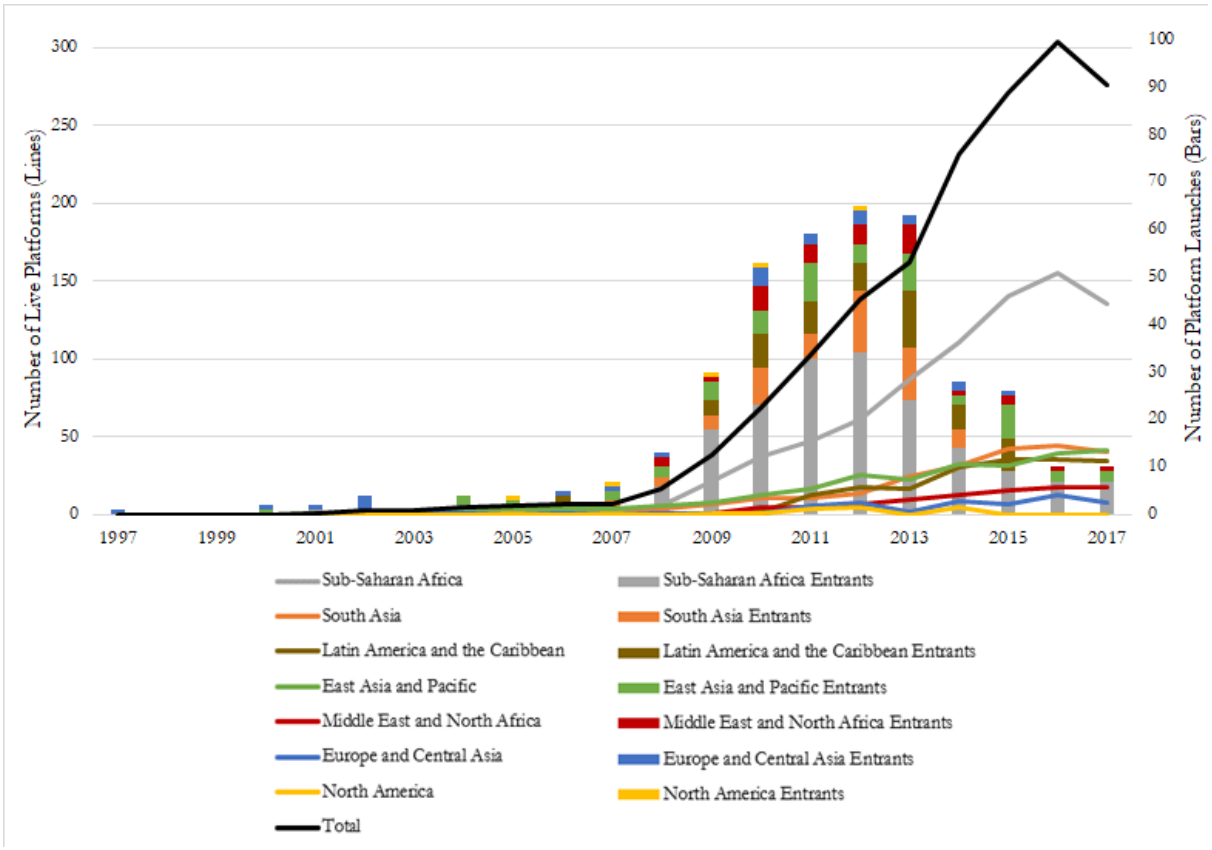
FIGURES & TABLES



Source: our calculations using GSMA data

Figure 1: Number of live platforms & platform launches over time

Table 1: Pioneers based on firm characteristics

Panel A

	Multinationals		Single Country Firms	
	Developed Country	Developing Country	Developed Country	Developing Country
Diversifying Entrants	***Cell 1a*** ***The Goliaths*** **NTT Docomo** (alliance) **Sonera** (single firm) ***Other entrants:*** Sony (alliance)	***Cell 1b*** ***The Goliaths*** **Celtel** (alliance) **MTN** (alliance) **True** (alliance) **Vodafone** (alliance)	***Cell 2*** Mobipay (alliance)	***Cell 3*** AIS (alliance) Globe (alliance) Grameenphone (alliance) Maxis (alliance) Sagentia (alliance) Smart (alliance) Oi-Telemar Norte Este (alliance) Telkomsel (single firm) Yandex (alliance)
Startups	*Not applicable*	*Not applicable*	***Cell 4*** ***The David 1s*** **Monitise** (single firm) **Obopay** (single firm) **Paybox** (single firm) ***Other entrants:*** Mint (single firm)	***Cell 5*** ***The David 2s*** **Comviva** (alliance) **Fundamo** (alliance) **Utiba** (alliance) **Wizzit** (alliance) ***Other entrants:*** Eko (single firm) mCash (single firm) Paggo (alliance) Paycash (alliance) PayMate(single firm) Suvidha (single firm)

Names of firms in bolded text represent those that engaged in internationalization.

Panel B

	Count of Firms	Fraction Internationalized
All	31	0.42
Diversifying entrants – All	17	0.35
In developed countries	4	0.50
In developing countries	13	0.31
Diversifying entrants – Multinationals	7	0.86
In developed countries (Cell 1a)	3	0.67
In developing countries (Cell 1b)	4	1.00
Diversifying entrants – Single Country Firms	10	0.00
In developed countries (Cell 2)	1	0.00
In developing countries (Cell 3)	9	0.00
Startups – All	14	0.50
In developed countries (Cell 4)	4	0.75
In developing countries (Cell 5)	10	0.40

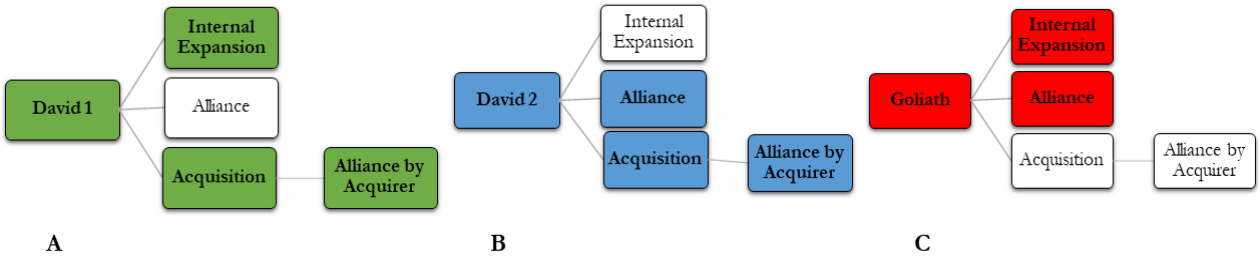


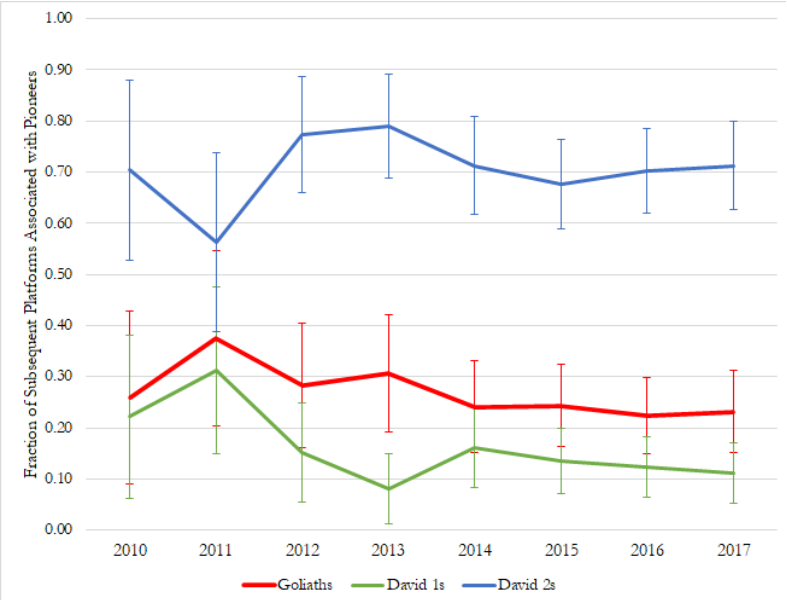
Figure 2: Internationalization strategies for each pioneering firm type

Table 2: Impact of pioneering firms & their internationalization strategies on global diffusion

Firm/Strategy for Expansion	Number of Platforms							
	2010	2011	2012	2013	2014	2015	2016	2017
Total Number of Follower Platforms	55	94	128	155	221	272	298	280
Number of Follower Platforms Associated with Pioneers	25	30	51	61	85	108	119	105
By David 1	**6**	**10**	**8**	**5**	**14**	**15**	**15**	**12**
Internal expansion	0	2	3	0	2	0	0	0
Alliances	0	0	0	0	0	0	0	0
Alliances by acquirer	6	8	5	5	12	15	15	12
By David 2	**17**	**16**	**39**	**48**	**60**	**72**	**83**	**74**
Internal expansion	0	0	0	0	0	0	0	0
Alliances	17	16	34	39	49	44	46	43
Alliances by acquirer	0	0	5	9	11	28	37	31
By Goliaths	**7**	**12**	**15**	**19**	**21**	**27**	**27**	**25**
Internal expansion	6	9	12	16	19	25	25	23
Alliances	1	3	3	3	2	2	2	2
Alliances by acquirer	0	0	0	0	0	0	0	0
Fraction of Follower Platforms Associated with Pioneers	0.455	0.319	0.398	0.394	0.385	0.397	0.399	0.375
Ratio of Platforms Associated with Davids vs. Goliaths	3.29	2.17	3.13	2.79	3.52	3.22	3.63	3.44

Source: Our estimates using our and GSMA data. Some platforms are impacted by more than one pioneering firm type.

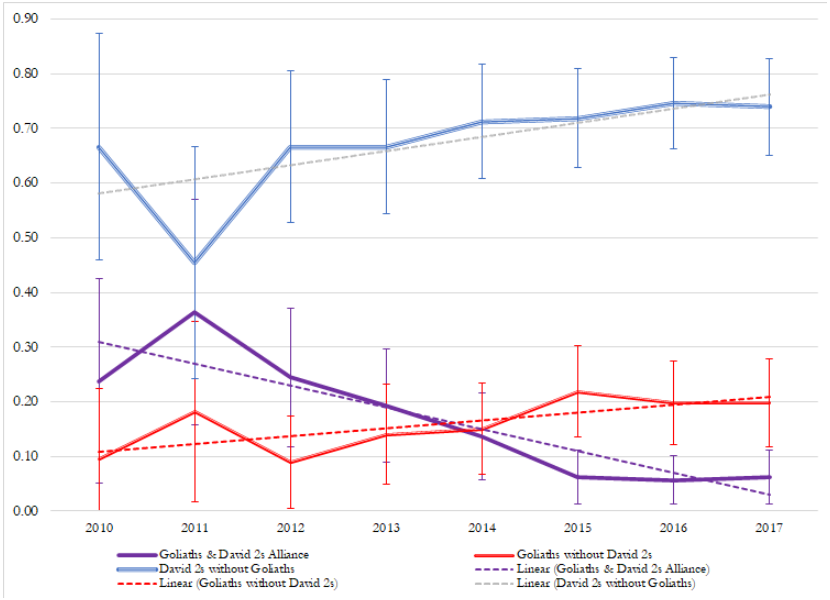
Implications: Almost 40 percent of platform launches during the industry's rapid expansion phase were associated with at least one pioneering platform, and this share remained stable over time. David 2s were associated with about twice as many platforms as Goliaths and David 1s combined.



Bars represent 95-percent confidence intervals. Source: our estimates using GSMA data. The fractions are the number of platforms associated with each of the three types of pioneering firms in a given year, divided by the total number of new platforms launched in a given year.

Implications: David 2s had by far the largest "participation rate" in new platforms launched between 2010-2017 among all platforms associated with the pioneering firms; they were present in about 70 percent of all such new launches. The "participation rate" by the Goliaths and David 1s is both economically and statistically less significant; moreover, it appears to be declining over time.

Figure 3: Fractions of subsequent platform launches associated with Davids and Goliaths



Bars represent 95-percent confidence intervals. Source: our estimates using GSMA data. The fractions are the number of new platforms launched in a given year and associated with an alliance between a Goliath and David 2, with a Goliath not in alliance with David2 and with a David 2 not in alliance with a Goliath, divided by the number of new platforms launched in a given year in which either a Goliath or a David 2 (or both) participated (*i.e.,* the sum of the above three).

Implications: About 30-40 percent of new platform launches in the early 2010s were associated with alliances between David 2s and Goliaths. Later on, however, these alliances decline sharply; David 2s especially continue launching new platforms in alliances with a larger and more diversified set of partners.

Figure 4: Fractions of subsequent platform launches by Goliaths and David 2s with and without the other

Table 3: Global industry impact of pioneering firms

Year	Total Number of Countries with Mobile Money	Percent of Countries with Goliaths	Percent of Countries with David 1s	Percent of Countries with David 2s	Percent of Countries with at Least One of the Pioneering Firms
2010	34	21%	18%	38%	56%
2011	58	21%	17%	26%	45%
2012	74	20%	11%	41%	52%
2013	74	26%	7%	49%	57%
2014	93	22%	14%	44%	55%
2015	94	28%	14%	53%	64%
2016	95	27%	14%	58%	68%
2017	91	26%	11%	56%	65%

Source: our calculations using GSMA data. The last column excludes double-counting (*i.e.,* it is not the sum of the previous three columns given overlaps).

Implications: The number of countries with mobile money almost tripled between 2010-2017. While the fraction of countries where the Goliaths deployed mobile money remained stable (largely constrained by their downstream presence as mobile network operators), David 2s considerably expanded their geographical scope, leveraging their ability to "specialize in generality."

Table 4: Top six platforms by global presence in 2017 & their connections to pioneering firms

Platform	Association with Pioneer	Global Presence (# of Regions, Countries and Country Names)
Orange Money (Orange S.A. and affiliates)	Comviva (David 2, India); Utiba (David 2, Singapore)	**4 regions, 16 countries: Sub-Saharan Africa** (Botswana, Burkina Faso, Cameroon, Central African Republic, Côte d'Ivoire, DRC, Guinea, Guinea-Bissau, Liberia, Madagascar, Mali, Niger, Senegal); **Middle East and North Africa** (Tunisia), **Latin America and the Caribbean** (Dominican Republic); **Europe and Central Asia** (Romania)
Airtel Money (Bharti Airtel)	Comviva (David 2, India); Utiba (David 2, Singapore); Obopay (David 1, USA)	**2 regions, 16 countries: Sub-Saharan Africa** (Chad, Congo, DRC, Gabon, Ghana, Kenya, Madagascar, Malawi, Niger, Rwanda, Seychelles, Sierra Leone, Tanzania, Uganda, Zambia); **South Asia** (India)
MTN Mobile Money (MTN and affiliates)	MTN (Goliath, S. Africa), Fundamo (David 2, S. Africa)	**1 region, 13 countries: Sub-Saharan Africa** (Benin, Botswana, Cameroon, Congo, Côte d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Rwanda, Swaziland, Uganda, Zambia)
M-PESA (M-Paisa, Vodafone Cash)	Vodafone (Goliath, UK); Comviva (David 2, India); Fundamo (David 2, S. Africa)	**5 regions, 11 countries: Sub-Saharan Africa** (DRC, Ghana, Kenya, Lesotho, Mozambique, Tanzania); **Middle East and North Africa** (Egypt); **South Asia** (Afghanistan, India); **Europe and Central Asia** (Romania); **East Asia and Pacific** (Fiji)
Mobi Cash (various national mobile network operators)	Comviva (David 2, India)	**2 regions, 10 countries: Sub-Saharan Africa** (Botswana, Burkina Faso, Burundi, Gabon, Mali, Mauritania, South Africa, Tunisia); **Middle East and North Africa** (Egypt, Morocco)
Tigo (Tigo Cash, Tigo Money, Tigo Pesa) (Millicom)	Comviva (David 2, India); Utiba (David 2, Singapore)	**2 regions, 10 countries: Latin America and the Caribbean** (Bolivia, Guatemala, Honduras, Paraguay, El Salvador); **Sub-Saharan Africa** (Chad, Ghana, Rwanda, Senegal, Tanzania)

Source: our calculations using our and GSMA data