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Repatriation or Reshoring of Manufacturing to the U.S. and UK:

Modular Theory-Building, Dynamics and Global Production Networks or From Here to There and Back Again

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ABSTRACT

There are three contrasting approaches to understanding the geography of production. The first approach emphasizes the importance of local agglomerations, the second intrafirm mechanisms, whilst the third highlights global relationships or GPN or GVC. These explanations are partial, but complementary. This paper explores the restructuring of global production with a focus on the reshoring or repatriation of manufacturing production to the US and UK. Our intention is to identify the drivers behind reshoring as the first stage towards developing a dynamic conceptual framework for understanding the global organization of production. Reshoring needs to be conceptualized by drawing upon and combining approaches developed in GPN with micro-approaches to understanding firms including the development of a geography of production tasks. The study is based on a theoretical mapping to inform an empirical analysis of reshoring in both countries to identify and conceptualize the quantitative and qualitative causal drivers behind this process. The evidence suggests that reshoring is sector-dependent and is mainly driven by manufacturers' cost-management and quality strategies combined with the importance of manufacturing products close to market. This involves a 'total manufacturing cost analysis' (TMC) in which access to a set of tangible and intangible inputs are key drivers behind dynamics of GPN.

Keywords: global production networks, global value chains, competitive dynamics, theory, incremental decision-making, evolution, reshoring of manufacturing, total manufacturing costs, U.S., UK.

Introduction

The first global shift was associated with the relocation or offshoring of manufacturing to low-cost locations contributing to the deindustrialization of developed market economies and geographically dispersed economic activity. This shift was assumed to be a permanent transfer of manufacturing employment from developed market economies to low cost production locations (Bluestone and Harrison 1982; Cohen and Zysma 1987). It now appears that the first global shift was not a unidirectional but is rather a dynamic bidirectional process as reshoring emerged as a corporate strategy. This identification of dynamics or bi-directionality in the management of global value chains (GVC) (Gereffi *et al.* 2005) or global production networks (GPN) (Coe *et al.* 2004) highlights the fluid and evolutionary nature of the spatial division of labor; production processes change, products are redesigned, demand is transformed and factor inputs alter. It is perhaps unfortunate that the GVC and GPN conceptual frameworks tend to under-theorize the origins and dynamics of geographically dispersed economic activity and instead have focused on governance. This suggests that the literature on commodity chains/networks needs to engage further with on-going debates on evolutionary approaches to economic geography (Boschma and Martin 2010) ensuring that change and dynamics are central to understanding the evolving geography of global production. Recently, Coe and Yeung have recognized that the existing GPN/GVC frameworks under-theorized dynamics and overemphasized governance (Yeung and Coe, 2015; Coe and Yeung 2015) while Ponte and Sturgeon have called for the development of a modular approach to theory building as they “believe in multi-causality [and] view endless substitution of one partial theory with another as a self-limiting exercise” (2014: 196). Nevertheless, the shift from GPN version 1.0 to GPN version 2.0 has yet to develop a convincing account of dynamics or what we term bi-directionality or even multi-directionality in the evolution of global production. We believe that identifying the drivers behind reshoring provides one element of what Sturgeon has termed “modular theory building” (2009) and that understanding the drivers behind multi-directionality will enhance understanding of the dynamics of linked enterprise structures or GVC/GPN. This article explores the reshoring of manufacturing activities to the United Kingdom and the United States by developing a structured approach to understanding the drivers behind this process. It is worth noting that the literature on reshoring by American firms is limited (Tate 2014; Zhail and Zhang, 2016). Much of the research has focused on Europe (Bryson *et al.* 2013) and this is, to our knowledge, the first paper to develop a comparative analysis. Our intention is to identify the *causal drivers* behind reshoring as the first stage towards developing a dynamic conceptual

framework for understanding the global organization of production. Part of the focus is on exploring the scale of the process, identifying what is being reshored, understanding the drivers and exploring some of the methodological and conceptual difficulties of researching reshoring and GVC/GPN dynamics.

Central to the restructuring of the geographies of production are the concepts of outsourcing and offshoring and more recently reshoring. Cowell and Provo (2015a) provide an initial analysis of the terms used by scholars to describe the global movement of production and capital over time by their geographic implications ranging from domestic to international. Outsourcing is often considered to be a cost-saving strategy in which a company agrees to purchase a component or service from the market rather than producing it within the hierarchy of a firm. Outsourcing does not imply the movement of production outside a national economy. The term ‘offshoring’ emerged in the business press in the 1980s to describe the process by which a business operation, or task, is shifted from one country to another. Offshoring became a survival strategy used by manufacturing firms located in developed market economies to compete against new competitors competing on price using low-cost labor. This period laid the foundations for the emergence of a new more fluid international spatial division of labor (Cowell and Provo, 2015b). This was encapsulated in 1998 during an interview on CNN Moneyweek, by Jack Welch, the then Chairman and CEO of General Electric, when he noted that “ideally, you’d have every plant you own on a barge to move with currencies and changes in the economy. You can’t do that, but the job of a company is to be agile and to capitalize on these things” (The Economist, 2013). Offshoring was driven by the identification of differentials in factor inputs combined with innovations in logistics and information communication technologies (ICT) (Cowen, 2014) and the development of capacity to supply new markets – it was about efficiency and/or market access.

Offshoring is an imprecise term as it describes the movement of activities across shores reflecting the origins of the term in the U.S. and UK. Not all offshoring is outsourced as a transnational corporation (TNC) may transfer production to a subsidiary located in another country; a practice termed ‘captive offshoring’. Offshoring was initially applied to manufacturing processes but in the late 1990s services began to be offshored leading to a second global shift (Bryson 2007). Offshoring is politically sensitive as it involves plant closure and the transfer of employment from one country to another. Donald J. Trump’s election as President of the United States was partly founded on a concern with the offshoring of American manufacturing jobs. A week after Trump’s election he phoned the chief executive of United Technologies to

discuss how 1000 jobs in Carrier, a heating and cooling company owned by United, could be retained in Indiana rather than offshored to Mexico (Schwartzdec 2016).

During the 21st century a new term emerged: reshoring. This describes the practice of repatriating a business operation that had been offshored. Reshoring is an imprecise concept that has become part of political debates about rebalancing economies as one response to the 2008 financial crisis. The imprecision of the process and the concept is reflected in the difficulty of tracking manufacturing processes that have been ‘reshored’. Reshoring may reflect the return of a process that was offshored, but the reshored process may include new routines that have facilitated the relocation, but transformed the process and the product. Reshoring does not necessarily imply a reversal of an offshoring decision or the closure of an offshored facility. There are great difficulties in researching reshoring, but it is important to begin to explore the scale and geography of the transfer or return of manufacturing production to developed market economies as one of the dynamic processes of global production.

This paper draws on macro-scale and micro-scale data of firms’ reshoring activities. The American analysis is based on the published reports of the ‘Reshoring Initiative’ⁱ, government and media reports. The Reshoring Initiative is a not-for-profit organization promoting and monitoring the reshoring of American jobs. The analysis of reshoring cases identified by the Reshoring Initiative provides an opportunity to identify and rank the push and pull factors behind reshoring to America. Media searches and published reports also provide examples for U.S. cases. National published surveys from employment and industry reports provide the macro context for the UK. In addition, 14 cases of reshoring are explored to identify the drivers behind production location decisions. These examples were identified using the ReshoreUK database (government initiative to register examples of reshoring), media searches and existing research data.

Reshoring and the Dynamic Theory of Global Production

To Dicken what differentiates this era of globalization from the earlier era of internationalization is the functional integration of internationally dispersed activities (2007). The GVC/GPN governance literature has made a major contribution to understanding functional integration. In this section, we review the GVC/GPN literature by developing an operational focus that is informed by the on-going debate on reshoring. The starting point is a discussion of firms and then intra-firm operations and tasks. Regional, national and international economies are the outcome of an accumulation of

many incremental micro- and macro-decisions made by individuals, firms and governments. The importance of incremental decision-making based on asymmetric information and bounded rationality implies that change or dynamics play an important role in shaping the on-going evolution of production. Production is the outcome of an accumulation of semi-rational firm-level decisions (investment, organizational form(s), sourcing, outsourcing) regarding inputs, operational tasks (fabrication processes, services, co-ordination and control) and outputs. These incremental decisions are affected by exogenous factors including the actions of suppliers, competitors, sector/products, conventions and standards, local labor markets, availability and cost of finance, energy and water, connectivity, governments, consumers and the media. Such decisions are the outcome of a complex endogenous process in which intrafirm politics, cultures and former decisions leads to trade-offs in decision-making processes. The various strands of the GVC/GPN literature often apply an implicit or sometimes explicit definition of a firm. Thus, in Yeung and Coe's paper in which they seek to develop a dynamic theory of GPN "a firm can therefore be thought of as a managerial device to optimize the accumulation and deployment of its available resources, defined as its core capability, at the lowest possible cost" (2015: 35). This definition overemphasizes rationality and optimization in firm-level decision-making processes and is arguably an accountancy-based definition. Our definition of a firm is much simpler – a firm is in a continual process of becoming, adaptation or evolution – it never becomes – and this process involves the temporary ownership or control of a bundle of assets by a group of individuals to co-ordinate tasks leading to the production of products/services (Bryson and Ronayne 2014). This places operational dynamics at the center of our definition, whilst acknowledging that firms have bounded rationality and are simultaneously cultural, social, political and knowledge processing entities.

More specifically, Yeung and Coe's recent work (2015, 2015) acknowledges that the substantial literature on GVC/GPN under-theorizes dynamics. There are two points to make regarding this. First, it is perhaps surprising that a theory of global production does not place dynamics and evolution at the center of its approach. Second, the attempt to develop a dynamic theory raises the issue of evolution and even co-evolution and their 2014 paper seeks to develop a "more extensive theoretical apparatus for explaining the evolutionary dynamics of global production networks" (33). Nevertheless, this new version of GPN – GPN 2.0 – does not engage with the on-going debate in economic geography on evolution including selection, variation, retention and diffusion (Boschma 2010). Economic geography is engaged with two separate but largely decoupled debates. On the one side, there is the GVC/GPN attempt to develop a macro-level

theory of global production focusing on the governance of inter-firm relationships combined with intrafirm coordination and more recently a focus on dynamics (Coe and Yeung, 2015) and polarity in governance (Ponte and Sturgeon, 2014). On the other side, there are on-going debates that explore intrafirm processes from an evolutionary perspective (Boschma and Martin, 2010; Bryson and Ronayne, 2014). The latter debate reflects the development of micro-level theory that engages, in part, with meso-level theory that explores clusters and regions. Of particular importance, are organizational routines or a firm's day-to-day dealings or "regular and predictable behavioral patterns" (Maskell and Malmberg, 2007:605) guiding actions and decision-making processes, providing continuity but also opportunities for change. These routines include operational and management tasks and strategies. Reshoring represents an alteration in a routine. The research challenge is to identify the drivers behind these alterations, but also to understand the outcomes. It is unfortunate that there is no on-going attempt to develop an exchange between these arguably disconnected debates and to move towards modular theory building (Sturgeon, 2009) that combines micro and macro theory. There needs to be a call for a less partial theory of the geographic organisation of production or a theory that develops a multi-scalar, multi-polar and modular dynamic account of economic activity by engaging with the interactions between intrafirm and interfirm processes. This is a call for economic geographers to explore the complex interactions between a set of endogenous and exogenous factors and processes.

Reshoring is a problem for GPN/GVC accounts that focus less on dynamics and incremental decision-making and more on governance, quantitative drivers and optimization. Reshoring has yet to receive any series attention by economic geographers (Bryson *et al.*, 2013). There has been a more sustained attempt in the business and management literature to identify the drivers behind reshoring (Wiesmann *et al.* 2017), but it is noteworthy that this is a debate in operation management (Srai and Ané 2016; Zhail *et al.* 2016) or supply chain management (Ellram *et al.* 2013; Ellram 2013; Tate 2014; Tate *et al.* 2014). The focus of the GVC/GPN debate is very much at the level of the firm and on corporate strategy, governance, value, embeddedness and power (Coe and Yeung 2015) and there has been a relative neglect of understanding the more operational intrafirm aspects of global production, or in other words understanding what *production tasks, processes, functions* are undertaken within and between firms and in specific locations (Bryson and Rusten, 2011). This is unfortunate as every product or service is created through the orchestration of a range of "tasks" or product/service-related processes; each task contributes costs and risks as well as profits. The creation of value in a

production process involves the bringing together of a range of different tasks and each task may have its own geography (Bryson and Rusten, 2011). A task may be a single routine or contain many routines and processes. Some tasks may be mechanized or digitized and some require face-to-face contact either within a production unit or between producers and consumers. Some tasks can be provided within a firm and some can be outsourced or be delivered by foreign providers. This represents the creation of a product via a production process that blends or bundles separate but related tasks together that are undertaken in different locations and at different times. This blending of tasks and their geographies is central to the evolution of a production network and is the consequence of a process of incremental decision-making involving negotiations, trade-offs and investment decisions. The identification of “tasks” provides a framework for exploring and defining offshoring and reshoring as involving the transfer of distinct tasks combined with the location of the task coordinator or coordinator of the production process. In this analysis, offshoring that involves outsourcing reflects the transfer of a task by the task coordinator to facilities located in another country owned or controlled by a third party. The third party may be resident in either country. The task may be offshored from America to a facility owned or controlled by another American company. Our account of tasks and task bundles provides both a methodological and conceptual framework for exploring offshoring and reshoring that adds an operational and dynamic dimension to the GVC/GPN debate. Reshoring is thus defined as the return of a task that had been previously offshored from a specific country, but the task may be transformed in some way as may be the outcome of the task. Reshoring might involve a change in the delivery of a task that still produces the same outcome. Alternatively, the routine remains the same, but the product has altered and this might be a qualitative alteration, for example a place-based association – Make in America.

Both offshoring and reshoring are complex processes; a task that is reshored might produce the same output, but not necessarily using the same routines; labor-intensive routines are digitized and mechanized, but the output remains unchanged. This might reflect a quantitative alternation (cost, profit margin and price). Alternatively, the routine remains the same, but the nature of the output alters qualitatively (quality, and intangibles including place-based associations – for example, Made in America, and speed/closeness to market). It is important not to associate reshoring solely with cost saving as there are important qualitative drivers behind offshoring and reshoring that are currently largely ignored in the GVC/GPN literature. This is an important point. An alteration in the geography of production is both a quantitative and

qualitative change in which a new solution is negotiated; an alteration will reflect some degree of discontinuity with the organization of the previous task and its outcomes.

GPN 2.0 tries to systematically conceptualize the causal drivers of GPN/GVC by abstract descriptions of their competitive dynamics (optimizing cost-capability ratios, market imperfections, and financial discipline) and risk environments (Coe and Yeung 2015). These critical interdependent variables, it is argued, shape the four main strategies adopted by firms – intrafirm coordination; interfirm control, interfirm partnership, extrafirm bargaining (Yeung and Coe, 2015: 43). But, this is a partial account of capitalist dynamics. Thus, the cost-capability ratio appears as a rational process of decision optimization based on the manipulation of a set of tangible inputs. But firms are political, cultural, social and economic entities with bounded rationality. To Yeung and Coe, a low cost-capability ratio is much harder to achieve when all “value activity, including manufacturing production, takes place in the home economy, because labor-related direct production costs in advanced economies tend to be high” (2015: 36). This ignores the substitution of variable costs (labor) with fixed costs (mechanization, robotics and artificial intelligence) and also neglects more qualitative and intangible factors that drive the evolving geographies of production including quality, speed, location relative to core markets and place-based associations. It also assumes that the shift is from high cost to low cost at a time when translocal firms from emerging economies are developing production capacity (manufacturing and services) in advanced economies.

There are many different types of offshoring from relocations to an adjacent country (near-shoring) to far-shoring and captive offshoring versus offshoring that includes outsourcing (Cowell and Provo 2015a, 2015b). For most firms their global commodity chains include a blend of different locations and strategies. Offshoring may involve the development of capacity to produce products and services within and for a foreign market as well as for exports. In the same way, there are different types of reshoring. Reshoring includes the intra-firm relocation of production or by sourcing production from home country suppliers. Reshoring can be part of wider ownership strategies and outsourcing decisions but reflects specifically the location of activities, tasks and routines in relation to the home country of the lead firm (Ellram 2013). Six types of reshoring activity can be identified conceptually and empirically ranging from repatriation of in-house production to component sourcing (Table 1). Reshoring has a temporal nature because it involves a prior process of offshoring that eventually leads to reshoring (Grey *et al.* 2013); a reshoring event is conceptually related to a previous offshoring decision, but the drivers behind this process may be different. There are additional forms that reflect defensive reshoring

(investment in on-shore production capability as a form of import substitution) and temporary reshoring (dual sourcing of products to provide slack in supply capacity). This diversity reflects the operational nature of reshoring.

INSERT TABLE 1

Reshoring of services has been occurring. For example, AT&T, the largest American telecommunications company, reshored a call center to Birmingham, Alabama, creating 360 jobs (Stavriotis 2009). In 2015, BT, the UK based telecommunications company created more than 1000 jobs in the UK as part of a strategy to ensure that over 80% of calls were answered from the UK (BT 2015). This is a classic case of service reshoring; in 2003 BT had shifted most of its call center operations to Bengaluru and Delhi. In this case, reshoring was promoted not by cost advantages but by the firm's poorly-rated support services as customers preferred speaking to British workers. Other companies such as Host Analytics, Alocira, Expedia, Priceline.com, and Monster.com have reshored services to provide better customer services (Stavriotis 2009).

The development of a dynamic conceptual framework for understanding the evolution of internationalization and deinternationalization requires an approach based on understanding the drivers behind alterations in production geographies. These drivers are simultaneously quantitative, or more tangible, and qualitative, or more intangible, and reflect the negotiation of intrafirm and interfirm power dynamics. The outcome, at any one time, reflects accumulations of incremental decisions that in our account are semi-rational based on bounded rationality, path dependency and existing capital and organizational investments or sunk costs and investments in on-going relationships with other firms, governments and consumers. Many of these incremental decisions lie at the interface between strategy, operations and market facing activities including product development and process innovations. This interface includes the ability to substitute labor with machines including artificial intelligence and to redesign the delivery and organization of tasks that leads to the production of finished products (goods and services).

The geography of production reflects an interplay between producer-driven and buyer-driven led strategy (Gereffi *et al.* 2005) or strategies that are based on resource-seeking, market-seeking, efficiency-seeking and strategic-asset seeking (Dunning, 1998). Our view is that the strategic outcome is a balance between strategy, operations and markets; optimization might be the intent, but not the outcome. Existing firm-level investments (time, finance and relationship building) are a constraint on change, but the drivers behind reshoring and offshoring are simultaneously quantitative and

qualitative and negotiated based on asymmetric information and existing investments. The interfirm influence includes concerns with quality and speed in outsourced-based economic relationships. This includes the ability to supply all types of customers (business-to-business, business-to-consumer) on time, to the right quality and in some cases to respond to requests for products that are made locally – those with place based associations. Extrafirm influences from nonfirm actors (the state, trade unions, consumers and other national organization) include a concern with a product's carbon footprint, quality and also geographical identity.

Outsourcing, offshoring and reshoring highlight the transitory and fluid nature of many corporate decisions made in response to competition and influenced by fashion, consultancy firms, wider framework conditions and copying competitors. Shifting a process or sourcing a product or service from one location to another reflects decisions taken on the basis of existing circumstances. Some of these decisions involve sunk costs leading to long-term path dependency as firms are reluctant to write-off capital investments. Outsourcing that is also offshoring involves a negotiated contractual agreement that locks the company into a relationship for a designated period. This implies that captive outsourcing involving foreign direct investment (FDI) may be less exposed to reshoring compared to outsourcing to a third party. Outsourcing that is also offshoring and market seeking will be more resistant to reshoring, but not to labor substitution. The governance of global commodity chains and the nature of the relationships across a chain determine the rigidity or flexibility of the chain as investment decisions and contracts restrict decision-making (Gereffi *et al.* 2005). Offshoring opens up the possibility for a future reshoring decision. Nevertheless, at this stage in the emergence of reshoring, economic geographers need to define and chart the evolving geographies of reshoring as decisions regarding the offshoring of production tasks are challenged and replaced with a return of tasks to developed market economies. The next two sections of this paper builds upon our conceptual framing of reshoring and GPN/GVC dynamics by exploring the evidence base for the reshoring of production to the U.S. and the UK identifying critical causal drivers.

Reshoring and the United States

Manufacturing in the United States remains an important engine of job creation and economic growth. Between 2009 and 2012 manufacturing accounted for 26% of total economic growth (LeCompte 2012). Policy initiatives have promoted manufacturing based around the 'Made in America' slogan (Kota and Vein 2012; Loeb 2013). The emphasis placed by the

U.S. government on U.S.-made goods resonates with increasing customer preferences for products that are American made by domestic workers. The emphasis placed on ‘Made in America’ is one of the motivations for some companies to reshore part or all of their production processes (Cowell and Provo 2015b). In 2013, it was estimated that between 30,000 and 40,000 new manufacturing jobs were created in America due to reshoring (Reshoring Initiative 2015). Two hundred and fifty five reshoring cases in various industry sectors have been identified (Table 2) in America, and over 800 documented cases of companies that have decided to manufacture in the U.S. instead of offshore (Reshoring Initiative 2015). Reshoring activity is sector dependent being more pronounced in sectors that are consumer driven, where rapid delivery and response time, customization, quality, and production flexibility are critical. This is an important point as it highlights the importance of closeness to market and quality as core drivers behind reshoring and the dynamics of GVC/GPN.

INSERT TABLE 2

There is a precise geography of American reshoring reflecting alterations in the differentials that exist between countries that were initially responsible for an offshoring decision. China was listed as the top country from which companies have reshored, followed by Mexico and India (calculated from the Reshoring Initiative Data Report, 2014). The Southern U.S. region, extending from Texas to Florida, leads the Midwest, Northeast and West in the total number of reshoring jobs; whereas, the Midwestern region leads in the total number of reshoring companies. South Carolina gained the most jobs compared to other states in 2014 because of reshoring. Texas, Kentucky, Georgia, and Tennessee together account for over 50% of all reshored jobs reported and 15% of all listed companies. The regions and states that have attracted the most reshoring jobs and companies are known for their business friendly environment, including skilled labor availability, taxation and other government incentives, low unionization, and low real-estate and other operating costs. Offshoring and reshoring are excellent examples of translocal processes; processes in which there is a direct relationship between two places. At the center of a GVC (Gereffi *et al.* 2005) or GPN (Coe and Yeung 2015) are relationships between localities or places that are embedded in particular forms of regulation, varieties of capitalism or provide firms with access to new markets. On the one hand, a task is reshored back to the U.S., but, it is reshored to a particular state and locality within that state; differentials between U.S. states should not be ignored as these play an important role in understanding what tasks are returned and to where.

The internal and external push and pull causal drivers and forces behind reshoring need to be considered. Table 3 provides the ranking of the most cited push and pull forces behind U.S. reshoring. Qualitative drivers including lead time, quality, and wage issues are the most cited push factors, followed by quantitative drivers including rising transportation, communication, inventory, and delivery costs; environmental concerns; intellectual property risk; supply chain management issues; regulation and compliance challenges; political instability; emergency response and natural disasters. The key drivers are further grouped and discussed in the UK cases. For the U.S., for example, rising Chinese manufacturing and shipping costs encouraged the Coleman Company to transfer the production of its 16-quart wheeled plastic cooler from China to Wichita, Kansas (Sirkin *et al.* 2011). Peerless Industries shifted work and consolidated all manufacturing of audio-visual mounting systems from China to Illinois to obtain cost efficiencies, shorter lead times and local control over manufacturing processes. These companies highlight the importance of cost control as a driver behind reshoring, but this is more than labor costs. A “total manufacturing cost” (TMC) is calculated by firms representing the aggregate cost incurred to produce a product over a given period. This includes the costs of direct materials, direct labor including taxes and benefits, indirect labor, overheads (rent, repairs, maintenance, depreciation, cleaning, heating/cooling, taxes, insurance, administrative overheads, distribution costs including packaging, logistics, research and development) and indirect materials (used to maintain machines and buildings). The unit cost of manufacturing a product is then calculated for production in different localities and for different ways of organizing tasks. A TMC approach represents an accountancy or quantitative perspective on the management and organization of production and is an approach that needs to be included in any modular theory-building project. This needs to be juxtaposed with a qualitative perspective based on the quality of the product, place-based product associations (made in America) and lead times between production and delivery to customers. The TMC approach differs to the “cost-capability approach” as it includes financial discipline. It is also an established technique that has been developed in managerial accountancy and used by firms to inform decision-making.

INSERT TABLE 3

Offshoring and reshoring are the outcomes of complex incremental decision-making processes based on commercially sensitive information involving TMC, including any subsidies or tax incentives, combined with market research and marketing. Increasing customer sophistication and demands require innovative design, quality products, faster product

turnover, and rapid communication and delivery times (Vanchan and Bryson 2015; Vanchan 2007). As a result, a skilled and flexible workforce is a contributing factor to reshoring (see Table 3). Other contributing factors include image/brand, policy incentives, automation, access to cheap energy, production flexibility; higher productivity and R&D; improved business processes, infrastructure and customer responsiveness; ecosystem synergies; and improved labor and real estate conditions. Incentives include government and other institutional incentives including private-sector initiatives, for example, Walmart's 'Made in USA' campaign. This initiative was launched in 2013 to increase the proportion of U.S. manufactured goods sourced by Walmart including 'new to Walmart' U.S. manufactured goods and re-shored manufactured goods. Walmart has been working with its suppliers to facilitate and accelerate reshoring (Walmart's U.S. Manufacturing Innovation Fund 2015) and has pledged to purchase approximately \$250 billion over ten years in products supporting the creation of American jobs. In this case, the product remains the same, but the place-based association is transformed reflecting a qualitative alteration and the manufacturing process may be less labor-intensive.

A complex and tiered approach at the regional, federal, and state level to encourage reshoring may never be enough to reverse offshoring, but it will encourage reshoring in some key sectors (Cowell and Provo 2015b). Under the former American President, Barack Obama, The White House's 'Skills for the Future Initiative' was launched in 2010 and was designed to improve partnerships between industry and community colleges and to facilitate a nation-wide network to improve workforce development strategies, job training programs, and job placement. Other White House initiatives include the new White House 'Supply Chain Innovation Initiative' intended to improve small and medium-sized enterprises (SME) involved in manufacturing with access to the technologies and resources required to improve innovation and productivity through public private partnerships (The White House 2015a). The White House has committed to strengthen U.S. advanced manufacturing by announcing new competitions for nearly \$500 million in public and private investment through a New Manufacturing Innovation Institute; a 'Manufacturing Extension Partnership' (MEP) to strengthen small manufacturers; and a 'New Revolutionary Fibers and Textiles Manufacturing Innovation Institute'. The latter is the ninth manufacturing innovation institute competition launched by the Department of Defense to ensure that the U.S. remains at the leading edge of fiber science with a matching investment of \$75 million by the administration in researching, prototyping, and commercializing fibers with extraordinary properties known as technical textiles (The White House 2015a). Local and state incentives, though varied and less visible, contribute to the

manufacturing renaissance. In a development program known as the Buffalo Billion, New York State Governor Andrew M. Cuomo pledged in 2013 that the state would invest \$1 billion over as many as 10 years to revive the Buffalo Niagara region economy (Buffalo News 2015; One Region Forward 2015).

The reshoring process is complex. Each task that is reshored reflects an alteration in a company's routines in response to exogenous and endogenous factors. The reshoring decision may be idiosyncratic or may be based on predictions about future trends. It is important to explore individual cases of reshoring to appreciate the drivers behind this process. In 2012, Apple announced that it would invest \$100 million in producing Mac computers in the U.S., beyond the assembly work already undertaken in the country (Rampell and Wingfield 2012). Two hundred jobs were created; rising wages in China and lower energy costs in the U.S. were the primary drivers behind this decision (Rampell and Wingfield 2012; Yarow 2013; Prah 2013; Seitz 2013; Reshoring Initiative 2015). In 2010, General Electric reshored the production of water heaters from China to a plant in Kentucky, creating 400 jobs (Bradford 2013). It also created 150 jobs producing energy efficient soft white bulbs exclusively for Walmart's 'Made in USA' initiative (Loeb 2013). Intellectual Property Rights (IPR) risks, ease of design collaboration, inventory and delivery problems were behind GE's decision to reshore production (Reshoring Initiative 2015).

After Walmart, the U.S. auto maker, Ford, is bringing more jobs back to the U.S. than any other American company, with a total of 3,200 jobs so far reshored from Mexico and Spain to Ohio (Sauter 2016). Ford reshored manufacturing of its F-650 and F-750 trucks from Mexico to a production plant in Avon Lake, Ohio and announced it would shift production of its 2.0 and 2.3 litre Ecoboost engine from Valencia, Spain to Cleveland, Ohio. Reducing shipping costs, improving manufacturing quality, and receiving millions in state tax breaks were behind these decisions (Sauter 2016). According to Bradford (2013), Japanese auto maker, Nissan, announced the creation of 1,000 jobs after moving production of its Sentra model from Mexico to Canton, Mississippi. Furthermore, it continued to add about 400 more reshoring jobs at a factory in Tennessee in 2014. Quality standards, labor concessions and government incentives contributed to the reshoring activity of U.S. automotive makers (Reshoring Initiative 2015).

In the Fall of 2014, Boeing announced that it would relocate several hundred manufacturing jobs from overseas to its plant in St. Louis, Missouri, by 2017 (Sauter 2016). The reshored jobs are primarily parts manufactured for the company's 777 series passenger jets. More jobs would be created at Boeing's assembly plant in Puget Sound, Washington (Sauter

2016). A power tools making company, DeWalt, reshored the production of power tool to Charlotte, North Carolina in 2013, creating 250 jobs (Elkins 2013). The image and customer's preference for 'Made-in-America' products were a dominant reason behind this reshoring (Elkins 2013).

NCR, an ATM-maker, has shifted its manufacturing from China, India, and Brazil to the U.S., creating 900 jobs (Reshoring Initiative 2015). The slow response from contract suppliers, especially lower tier suppliers, rising Chinese wages, proximity to customers and engineering contributed to this shift. Energid Technologies, a developer of advanced software and robotic systems for the aerospace, agriculture, manufacturing, transportation, defense, and medical industries reshored their operations from India to Cambridge, Massachusetts in 2014 (Jones 2014). This relocation made financial sense when all the costs of doing business were considered, i.e. proximity to customers, inventory size, working productivity and wages, tariffs and shipping (Jones 2014). Element Electronics, the only American-owned television manufacturer reshored production from China to Winnsboro, South Carolina in 2013 with an investment of \$7.5 million and the creation of 500 jobs over a five-year period (Crumbo 2013). Image/brand, patriotism, lower tariffs, freight cost, and improvement in customer responsiveness and production cost contributed to this decision (Crumbo 2013; Reshoring Initiative 2015). Farouk Systems, a manufacturer of hair irons, reshored the production of hand-held appliances from China to Houston, Texas, employing 1,200 workers to increase control over manufacturing and distribution (Aeppel 2009).

The return of apparel/textiles manufacturing to the U.S. has been noticeable over the last few years, although the number of reshored jobs is much smaller than those that have been offshored. Major designers, retailers, and smaller companies have reshored production from other countries, creating around 1,000 U.S. jobs (Davidson 2015). Brooks Brothers, designer and retailer of menswear, purchased a plant in Haverhill, MA in 2008 and reshored 70% of their production of suits, dress shirts, pants, and overcoats, from offshore locations. In March 2015, President Obama announced a commitment of nearly \$500 million in public-private investment to strengthen American manufacturing by investing in cutting-edge technologies through a new, textiles-focused manufacturing institute competition led by the Department of Defense, and by sharpening the capabilities of small manufacturers through manufacturing extension partnership competitions in 12 states (The White House 2015a).

There is always more than a single factor behind a reshoring decision. Two groups of factors can be identified, but nearly all reshoring decisions involve both types. On the one hand, there are quantitative factors related to TMC including energy, labor costs, shipping and automation. Some of these are included in Coe and Yeung's cost-capability ratio combined with financial discipline (2015), but the operational dimensions are largely ignored. On the other hand, there are more qualitative factors related to intellectual property right (IPR), quality, the changing nature of demand, place-based product identities and brand, closeness to market and patriotism. This is a complex set of qualitative drivers that needs to be incorporated into any dynamic theory of GVC/GPN. These two groups of factors highlight a balance between cost control or the tangible aspects of production with more intangible factors that are not directly related to production costs. Nevertheless, these intangible factors are important for marketing, product identity and placement and may directly affect turnover and profitability as they may be reflected in higher returns on investment. American companies benefit from access to a single integrated market and a political environment that has been encouraging reshoring through, for example, alternative energy sources and 'Made in the U.S.' campaigns. In the next section, we explore reshoring cases in the UK including a detailed breakdown of key drivers behind reshoring to the UK.

Reshoring and the United Kingdom

Manufacturing in the UK remains an important part of the economy, contributing 10% of gross value added in 2015 and 8% of employment in 2016 (Tyler 2017). The sector has received a renewed political focus since the recession of 2008, with the development of a core industrial strategy that supports the aim of rebalancing the economy through the growth of manufacturing. Reshoring has become a topic of interest for policy makers and the popular press, often citing a mix of high profile and smaller niche cases of production returning to the UK and has become more important with Brexit or the on-going negotiations regarding the exit of the UK from the European Union. Estimates of the impact of reshoring to date are small. UKTI estimate that 1,500 jobs have been reshored since 2011 (Prime Minister's Office 2014) while a recent survey of UK automotive manufacturers found that UK-supplied parts accounted for 44% of value in May 2017 compared to 36% in 2011. The absolute number of cars produced had increased by 38% implying that parts sourced locally had increased by 60% over the period 2011-2017 (Holweg et al, 2017). Surveys of manufacturing firms have attempted to quantify the number of firms experiencing or considering reshoring production to the UK. The EEF published results of

their survey in the Backing Britain report, which identified that one in six firms had reshored production (in-house) and a further one in six firms had switched from an international to domestic supplier in the past three years (EEF/Squire Sanders 2014: 9). In a recent EY report (2015), the potential value of reshoring to the UK was estimated to be £15.3bn of GDP and 315,000 jobs (EY 2015:3).

These levels are relatively low in comparison to the ongoing UK off-shoring production trend, which was valued at £36bn, 1995-2011 (567,000 jobs) (EY, 2015:5). The Backing Britain report (EEF/Squire Sanders 2014: 8) identified an interesting relationship between the existing geography of a firm's production facilities and offshoring. On the one hand, the number of firms producing overseas between 2004 and 2013 has declined for firms that had between 0-24% of their production overseas. On the other hand, the number of firms increasing off-shoring activity grew for firms with a significant proportion of production located overseas (25% +).

The 2008 recession has been reported to be a catalyst for firms to reassess their supply chains (EEF/BDO 2009). Credit restrictions, reduced demand and working capital tied up in long lead times enhanced risk during the recession. A 2009 survey undertaken by the EEF/BDO first indicated a surge in reshoring manufacturing to the UK as part of a wider spatial reorganization and diversification of supply chains to reduce risks (EEF/BDO 2009). Innovation in supply chain management and strategy continues to be observed in industry surveys (KPMG 2013; EEF/Squire Sanders 2014). The UK, however, remains a key production location for domestic firms because of capabilities in the supply chain, access to the European market and stringent legal frameworks for intellectual property protection (EEF/BDO 2009).

Although there is evidence of reshoring from macro surveys and widespread anecdotal evidence, it is far more difficult to identify individual cases of reshoring activity to the UK. A formal databank has been established by government bodies across the devolved regions of the UK to collate this information: ReshoreUK (Prime Minister's Office 2014). This initiative has been created to support firms (small and large) considering reshoring activity to the UK by providing advice and collating known examples of reshoring (Gov.UK 2015). ReshoreUK currently cites only 13 instances of reshoring, including three cases of the repatriation of call centers and ten cases of the reshoring of production (in-house and contracted) to the UK. Due to its limited coverage, media searches and existing research data have been used to supplement the information provided at ReshoreUK to investigate the drivers and barriers of reshoring. The cases

listed in Table 4 below are those for which a profile of the reshoring activity can be constructed (location, contract relationship, impacts and drivers).

INSERT TABLE 4

The reshoring cases highlight the diverse nature of reshoring activity in the UK, with products ranging from low cost decorations and paper cups to high value automotive components and textile products (Table 4) and this diversity reflects the complexity required to develop a more dynamic theory of global production. The cases are predominately about reshoring from China and the Far East (10/12 cases). Overall, the value of reshoring is relatively low in these cases in terms of employment, echoing results of the 2014 survey that found minimal employment increases associated with reshoring (EEF/Squire Sanders 2014). Investment in production infrastructure (sites and machinery) is associated with repatriation of production in-house, reflecting the expansion of facilities required to increase or develop production facilities in the UK. In other words, reshoring to the UK involves investment in machines rather than employing many workers.

The decision to reshore production tasks to the UK includes five of the six processes identified in Table 1: investment in on-shore production capability rather than offshore production; repatriation of in-house production; repatriation of off-shored production to in-house; component sourcing via contract manufacturers; and temporary repatriation of component sourcing. Identifying the use of intermediary suppliers based in the UK to source production in low-cost regions is difficult. Both this form of reshoring and the shift between suppliers for dual sourced products adds complexity to the reshoring debate. These forms are often hidden in the ongoing reorganization and adjustment of value chains. These sourcing decisions are not simply a choice between home or foreign production but involve wider organizational decisions about diversification and risk management and multiple push and pull factors. The causal drivers behind reshoring back to the UK can be broadly grouped into cost or quantitative drivers and qualitative drivers including flexibility, market, risk and speed (see Table 5). These are explored in turn.

INSERT TABLE 5

Cost-based Drivers

Rising costs in low-cost regions were the most commonly cited driver behind reshoring. Increasing labor rates, energy and transportation costs and associated costs for employment and movement of products have eroded the cost advantage of

some offshored production. In addition, productivity improvements through skills, automation or process innovations have further reduced the cost advantages of offshoring. However, in all cases there were additional push and pull factors behind the decision to repatriate production.

Vent-Axia, manufacturer of ventilation systems, reshored production of domestic fans in 2013 to the UK from China (Vent-Axia, 2014). Manufacturing in China remains considerably cheaper than in the UK but rising costs and supply chain logistics have reduced the advantages to be gained by offshoring. In addition, higher rates of productivity in the UK have further eroded TMC. The decision to bring production back to the UK was, however, part of a wider restructuring programme, including the acquisition of European-based companies by the parent company Volution (Vent-Axia 2014). The reshoring of the production line was seen as a part of this process by generating a strong supply base in the UK for future international expansion. Calderia UK Ltd. manufactures home textiles and is based in Liverpool. The company established a Chinese joint venture in 2004 (EEF/Squire Sanders 2014). Costs increased five times over eight years (Prime Minister's Office 2014), prompting the company to adjust their production strategy and reshore some production (higher value products) to their in-house UK production facility. The 'Made in Britain' brand has helped strengthen the position regarding the UK production for these products, although the company maintains a blend of far- and home-sourced production across product lines.

Flexibility-based Drivers

Flexibility in production to respond to customer demands and reduce inventory are significant drivers behind reshoring. The inherent difficulties in managing far-sourced production from long delivery cycles and economies of scale for orders reduce this flexibility. Capacity for local production illustrates a time dependent element behind sourcing decisions. Multiple sourcing is a common strategy for mitigating the risk of supply disruption, forced price rises and increased demand. The location of supply capacity is a critical factor. By retaining capacity close to the customer they are able to provide short lead times. The Pump Manufacturer is an example of this type of reshoring decision. The company launched a new product during 2009-10. The development work was undertaken in conjunction with a local supplier with the intention for them to provide production capability until it became cost effective to source the components from a Chinese manufacturer. Just prior to the transition the Chinese manufacturer was closed for IPR infringement on another customer's products. The customer re-located production to its existing UK-based supplier while it established a new Chinese

manufacturing partner and developed procedures to protect against illegal copying. The IPR infringement was a particular problem as the firm had developed a new product. This was a temporary sourcing arrangement; the cost savings of manufacturing in China was around 30% compared to the UK, primarily because of relatively high labor content for this product and difficulties in mechanizing production.

Market-based Drivers

Market-based drivers are pull factors and include access to markets and brand advantages for production in the UK. The expansion of on-shore production capability is a defensive form of reshoring, reducing imports and increasing exports. JCB, a construction equipment manufacturer, recently announced plans to extend production capacity in the UK (Gov.UK 2013), paralleling investments in overseas markets, notably Brazil (Stirling 2012). This investment includes developing the current Staffordshire site to expand current product lines and the reshoring of the manufacture of some tractor cabs. A well-publicized factor for this locational choice was a government announcement of plans to develop local infrastructure around the Staffordshire site (Gov.UK 2013). This will provide more efficient transfer of components between JCB sites and from local and international suppliers. In addition, the UK sites export 75% of their production and therefore an efficient route out of the UK is equally important. The reshoring of some production is part of a wider expansion strategy, for which a key part continues to be strategically located production capacity to meet current and future market demand.

A Heritage Carpet Manufacturer repatriated some of its production activities in 2012/3 following a loss of demand. The company has in-house production facilities in the UK, Europe and India and was investing in a Chinese facility. The company experienced a reduction in demand, commodity price rises and cash flow difficulties and was forced to restructure. The restructuring led to a focus on higher value products of stocked and bespoke carpets capitalizing on the UK brand. An investment plan was introduced and the planned production in China was reshored to the UK where advanced production technology provided opportunities for demand responsive and higher value manufacturing. The company retains production in the UK, Europe and India to provide a package of products that range from high-value bespoke manufacture to standard mass produced products. The production facilities are supported by a network of design offices in key markets around the world.

Risk-based Drivers

Risk of theft of IPR, supply chain disruptions and inconsistent quality are significant drivers behind reshoring (Table 5).

Long supply chains have the potential for disruption to supply. The case of Hornby, a toy manufacturer, illustrates this. Hornby mass produce model railways, slot car racing and die-cast toys based on UK designs but production was offshored to India and China. There had been ongoing supply issues across Europe from the Chinese manufacturer. Quality was reduced after the company moved to another Chinese supplier and supply was disrupted. But in 2013, over 10% of the products ordered were not delivered, causing significant profit impact and disruption (Hornby PLC 2013: 7). The supply difficulties were centered on the production of high-end and new product lines, which ultimately prompted Hornby to re-evaluate its sourcing decisions and to source these products from UK-based manufacturers. This coincided with a decision to restructure the business towards more customer-led product innovations and multi-channel distribution. The UK supplier also offered to develop these distribution channels, as well as secure production. Ultimately, the labor intensive products are still produced in China but now 60% of the Humbrol model and craft manufacturing and the new Airkit product line are manufactured in the UK (Hornby Hobbies 2012).

Swan Mill, manufacturers of paper tableware products and decorations, repatriated tinsel manufacture from the Far East in 2013. The company manufactures some of its products in Kent and has a UK importation hub in Wales for the offshored production. The company has primarily a UK market, for bespoke corporate tableware, but has grown international sales in recent years, which are served by Asian distributors. Following quality issues with the long distance transportation of tinsel, the company decided to invest in new machinery to manufacture the product in the UK. Mechanization provided cost savings and the overhead of the facilities in the UK are shared within the product portfolio that is manufactured there.

Speed-based Drivers

Speed of manufacture has become a significant advantage for manufacturers. Technology, product and process innovations and the co-location of design and manufacture can reduce the time needed to respond to changing market conditions and increase demand responsiveness. Several reshoring cases highlight how speed is a driver for reshoring activity to the UK.

The capacity to innovate in the production process is a key element of sustainable competitiveness. Laxtons, a manufacturer of high quality worsted yarn, repatriated all production activities from Europe in 2010 (Making it in Leeds 2013). After off-shoring production in 2001, the company decided to invest in cutting edge weave technology. By

manufacturing in the UK design and production activities could be undertaken at the same location. Critically, it allowed the firm to undertake short product test runs before large scale production, which was difficult with overseas production because of lead times and economies of scale for production and transportation. This allowed not only greater innovation in product and process, but provided the capacity to gradually scale up production (from test to batch to mass production), reflecting demand rather than meeting production quotas for economies of scale in shipping. In addition, the company reported a reduction in true fabric costs for a quality yarn of 15% (Making it in Leeds 2013).

Mass production of a low value product is possible in the UK. A low cost starter computer developed by a team of academics at the University of Cambridge as an educational device for primary school children has become popular with computer enthusiasts. Demand for the Raspberry Pi has been growing since its launch in 2011/2. This computer was originally manufactured in China by contract manufacturers since it could not be competitively sourced in the UK. The rapid rise in demand for the computer was difficult to meet with long distance supply; lag times on orders and delivery meant that demand could not be met. Investment in production techniques by Sony Manufacturing meant that a key part of the production process could be mechanized, reducing the product's labor content. As a result, manufacturing was repatriated to Sony's UK facility and Raspberry Pi's are completely manufactured in the UK for a price of £25-35 at 30,000 units a week (Partridge 2011). By locating production to this facility production can be increased rapidly to meet demand and delivery times were reduced.

The Paper Cup Company has undertaken a gradual process of reshoring production from its Chinese facility to its UK facility since 2012 (Prime Minister's Office 2014: map, The Paper Cup Company icon). The company was founded in 2005 and subsequently established production facilities in China in 2007 to manufacture a range of paper cups. Although the product is relatively low cost, the drivers for reshoring the activity to the UK were not based on eroding cost savings. By manufacturing in the UK using new machinery the company was able to offer an additional service to the market based on the extremely fast production of bespoke designs (72 hour total turnaround time). Technology has been critical in opening up production routes in the UK. The company is planning to use 3D printers to produce products in the UK rather than off-shore production after the prototyping. Product and process innovations have enabled production to be outsourced to local UK suppliers which have the capabilities to undertake this form of manufacture.

Conclusion

As an initial contribution towards understanding the dynamics of the evolving geographies of global production, this article explored the repatriation or reshoring of manufacturing to the U.S. and UK to identify quantitative and qualitative endogenous and exogenous causal factors shaping the competitive dynamics of global production. Reshoring highlights the importance of understanding the causal drivers and dynamics behind GVC/GPN, and perhaps more importantly draws attention to the need to develop a more 'operations' focused account of global production. It also highlights that GVC/GPN have within them bi-directionality that is the result of perceived or actual alterations in the causal drivers behind previous investment decisions. A theoretical mapping or framing of firm-level decision-making is required that emphasizes that global production is the outcome of an accumulation of many incremental micro and macro decisions made by individuals, firms and governments. This accumulation includes the decisions that determine the sub-division of tasks and their geographies that lie about a production process. This reflects an on-going evolution of a spatial division of labor, but also a balance between variable and fixed costs or between labor and machines and artificial intelligence. This reflects our definition of firms as in a continual process of becoming but in a context of bounded rationality; firms are simultaneously social, political, cultural and economic entities.

This article is the outcome of a process of theoretical mapping and empirical analysis resulting in both a critique of the existing literature on the dynamics of global production, but also the identification of additional or alternative drivers that contribute to the evolving geographies of global production. These include a focus on semi-rational, sometimes idiosyncratic, incremental decision-making processes with outcomes that represent negotiated trade-offs and also an appreciation of the role tangible and intangibles play in the evolution of global production. Theoretically, global production can be considered as the outcome of an optimizing cost-capability ratio that responds to market imperatives and financial discipline. In reality, it is a much more messy sub-optimal process in which accountancy tools, including TMC analysis, have been developed to inform decisions, but intangibles, including non-cost related factors, play an increasingly important role in shaping the evolving geography of global production. These factors include quality, speed or lead times and closeness to market, government policy and political interpretations that shape firm behavior.

All this suggests that understanding the evolving geography of global production is a complex task. There are two sides to this task. On the one side, is the attempt by Coe and Yeung (2015) and Ponte and Sturgeon (2014) to develop

theory or a conceptual framework for exploring the geography of production. On the other side, “. . .is vast quantities of empirical work on particular chains and the experience of particular firms and regions in them, and relatively little theoretical work attempting to account for these findings in a systematic and integrated way” (Yeung and Coe, 2015: 31). There is a major problem here. At the moment, GPN 2.0 does not assist in understanding the dynamics of reshoring. There are too many drivers and processes behind reshoring that are not included in this proto dynamic theory. This is surprising as reshoring is an example of a core dynamic process that reflects a reversal of an earlier offshoring decision. This reversal makes the study of reshoring important for shaping theoretical development; reshoring decisions are the outcome of very different drivers compared to the decision to offshore.

Our approach has been informed by the conceptual work on GVC and GPN, but our project is more than the analysis of a particular chain or region, but the analysis of many different sectors and firm-level decisions. From this, there are four important points to consider. First, we agree with Sturgeon’s (2009) call for modular theory-building to conceptualize the complexity of the geography of global/local production and for understanding functional integration. Nevertheless, it is important to develop less partial theory. Second, the GVC/GPN conceptual framework must engage in a discussion with the literature on operations and reshoring. This includes an appreciation of operational tasks and the drivers behind their geography. This is an issue of scale or the object of study. Our analysis of reshoring, highlights the importance of understanding the geography of tasks and associated routines with a task producing an output that might be a component or service or a completed product/service for end-consumption. The GVC/GPN analysis emphasizes firm-level decision-making, interfirm control and intrafirm coordination (Yeung and Coe, 2015; Ponte and Sturgeon, 2014) and neglects to explore the geography of tasks and routines that are some of the fundamental buildings blocks of production processes. Third, a dynamic theory of global production must include an appreciation of quantitative as well as qualitative drivers. The existing theory is strong on quantitative ‘rational’ drivers, but weak on qualitative drivers including flexibility, nearness to market, place-based product associations and risks related to IPR. Fourth, the GVC/GPN literature needs to engage with the practices, processes and routines developed by firms to manage, evaluate and co-ordinate their operations. This includes an appreciation of the application and impact of TMC analysis on the evolving geography of production combined with more non-price based qualitative factors.

Further research needs to identify the tasks and related outcomes that have been reshored by firms and relate these to the offshored tasks. A reshored task might be very different from that which was offshored and the outcomes might also be different. These qualitative differences matter, but are difficult to identify. Reshoring has captured the attention of academics, policy makers, and professionals, but it requires cautious examination. In the U.S., Donald Trump's presidency underscores a strong public sentiment behind a causal relationship between reshoring and job creation. Despite increasing evidence of reshoring in both countries (more pronounced in the U.S. than in the UK), it still represents a fraction of companies that have offshored or invested abroad. The evidence suggests that the U.S. has become a more attractive location for manufacturing companies when a rigorous TMC analysis is undertaken compared to some offshore locations. The U.S. has a production-cost advantage in many industries over much of Europe, largely because of wage increases in Europe when adjusted for productivity (Sirkin *et al.* 2012). For example, U.S. productivity-adjusted wages are estimated to be only 67% of German wages in 2015 (Sirkin *et al.* 2012). Furthermore, labor costs in the U.S. have risen less than those in China and their European counterparts over the last 15 years. The U.S. has the advantages of a large domestic market combined with the shale gas revolution which are strong pull factors for manufacturing firms. In comparison, the UK is facing energy supply problems (Mulhall & Bryson 2013), as well an uncertainty about continued access to the European Single Market. Barriers to reshoring include the availability of skilled labor, rising energy costs, land use planning and environmental regulations, rising demands in foreign markets; and the need for diversification and risk minimization by TNCs.

The empirical detail of the U.S. and UK cases has enabled a richer understanding of operational activity and the causal drivers behind the dynamics of GVC/GPN. Reshoring processes include a spectrum of activities ranging from temporary repatriation of component sourcing, to repatriation of off-shored production, to in-house facilities, to repatriation of in-house production, and to investment in on-shore production capability. These result in different types of reshoring involving alterations in the geography and temporality of global commodity chains. Although reshoring activity occurs across sectors and technological levels, it is sector dependent. It is more pronounced in sectors that are *consumer driven*, where *rapid delivery and response time, customization, quality, and production flexibility are critical*. These sectors include electrical equipment, appliances, and components; transportation equipment; computer/electronic products; machinery; and apparel/textiles. As a result, low-cost locations such as China, India, and Mexico are no longer

offering the same cost savings. From a push factor perspective, rising labor cost, currency variation, longer lead times, quality, warranty, and intellectual property issues have contributed to U.S. and UK reshoring. Energy costs can be observed as both push and pull forces. Rising energy costs in low-cost countries such as China and India compared to decreasing energy costs (coal, natural gas) and alternative energy (biofuel, fracking) in the U.S. and less secure energy for production in the UK have contributed to reshoring. A skilled and flexible workforce, coupled with government incentives, production flexibility, increasing automation, image/brand sensitivity, and proximity to customers serve as enticing forces for reshoring firms/companies to increase FDI in the U.S. by European, Canadian and Asian firms. Corporate image/brand can be observed through the lens of corporate social responsibility, which includes community contributions, environmental consciousness and human rights protection. These have increasingly played a role in driving reshoring. An increase in patriotism or nationalism is an important driver behind the rejuvenation and regeneration of American and British manufacturing but with a focus on employment.

China has been an important location for offshoring and outsourcing compared to other low-cost countries such as Mexico and India. However, the saving margin has been reduced in these low-cost countries, particularly in China and India, making them less desirable production locations. The savings from reshoring are greater for U.S. compared to European firms. An analysis on a productivity-adjusted basis identified that in 2010 an average U.S. worker was around 35% cheaper per hour compared to an average Western European worker (Sirkin *et al.* 2012). In other words, from a TMC perspective China's location as a core country for offshoring production has been challenged. The southern U.S. states, such as South Carolina, Texas and Kentucky continue to be the most important reshoring and business investment destinations because of their flexible and productive workforce, low-cost real estate and overall operating costs, as well as local and federal incentives. Aggressive manufacturing policies such as those in the U.S., coupled with current favorable drivers, will continue to facilitate U.S. and UK reshoring.

Different types of reshoring have been occurring in developed countries such as the U.S. and UK. It is expected that these processes will continue as long as there are strong institutional and market support systems in place. It is important, though, not to underestimate Chinese competitiveness, as their existing manufacturing base and aggressive government policies will work to offset some of the barriers to continued offshoring to China. Manufacturing of labor-intensive goods will continue to occur in low-cost countries such as China, India, Vietnam and Cambodia. The temporal nature of

sourcing decisions makes decisions about reshoring complex. Whereas investment in hierarchical governance structures create visible and relatively stable decisions, market and network governance structures hide the complexity of sourcing arrangements that may involve different forms of long- and short-term repatriation of production.

This paper conceptually and empirically examines reshoring processes based on evidence from the U.S. and UK. These processes include pre-shoring and reshoring activities. However, a detailed follow-up study is needed to further quantify the reshoring phenomenon. For example, what percentage of firms have reshored compared to offshored? How many of those offshored have reshored? In what ways do production systems and products alter as a task is reshored? Future research is needed to understand the impact reshoring has on local economies. What happens after companies have reshored - post-reshoring? What are the contributing factors to the success or failure of reshored firms? From a broader perspective, a global study of reshoring, including both developed and developing market economies would identify firm strategies and the changing causal drivers behind the evolving geographies of national and global production. This would advance GVC/GPN-related theory building by acknowledging the heterogeneity of firm-level behavior observed in the field. Furthermore, it is always worth remembering that the economy, firms and consumers are in a continual process of becoming; GVC/GPN-related theory must be adaptable and flexible as it responds to fundamental alterations in the drivers that lie behind the evolving micro, meso and macro geography of production.

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Table 1: Types of Manufacturing Reshoring

Type	Description/Characteristics
Investment in on-shore production capability	Expansion of facilities in home-nation.
Repatriation of in-house production	Production returns to home-nation from foreign facility owned by lead firm.
Repatriation of off-shored production to in-house	Production returns to in-house facility in lead firm (home-nation) from sub-contracted foreign sourcing (near- or far-nation).
Component sourcing via contract manufacturers	Production returns to sub-contracted home-nation supplier from sub-contracted foreign-sourced supplier (near- or far-nation)
Component sourcing via intermediary manufacturer, production remains far-sourced	Sub-contracted home-nation supplier undertakes foreign sourcing on behalf of lead firm. Home-nation supplier undertakes quality control and logistics management functions, production remains in foreign-sourced sub-contract facility.
Temporary repatriation of component sourcing	Lead firm operates dual sourcing to manage supply using sub-contracted suppliers in home- or near-nation, as well as far-nation suppliers. Production returns to home- or near-nation supplier temporarily for capacity management.

Table 2: Reshoring Cases by Industry

Industry	Reshoring Cases
Electronics/Appliances/Components	41
Computer/Electronic	26
Apparel	24
Hobbies	23
Transportation	22
Plastic/Rubber	18
Fabricated Metal	18
Machinery	16
Medical	15
Wood Products	14
Energy	8
Chemicals	4
Castings	3
Primary Metal	2
Non-metallic mineral products	1
Other: primarily food, services, and home and office products	20
Total	255

Source: Reshoring Initiative Library, March 2014

Table 3: Reasons for Reshoring, US Firms

Push Factors	Pull Factors
Lead time	Skilled workforce
Quality/rework/warranty	Image/brand
Rising wages and currency variation	Government and other*institutional incentives
Freight cost	Automation/technology/3D printing
Total cost	Energy prices (declining natural gas and coal prices)
Inventory	Production flexibility (customization, redesign of parts, etc.)
IP risks/supply chain interruption risks	Higher productivity
Delivery	Research and Development (R&D)
Communications	Lean or other business process improvements
Environmental considerations/loss of control	Ecosystem synergies
Travel cost/time	Infrastructure
Price	Customer responsiveness
Regulation and compliance	Lower real estate/construction costs
Political instability, emergency response, natural disaster	Labor concessions

Sources: Reshoring Initiative (2015) Reshoring Data Library, March 2014 and Through December 31, 2014; Conerly (2014)

Table 4: Reshoring Cases in the UK

Firm	Product	Type of reshoring	Date of reshoring	Value	Current location of production	Previous location of production
JCB ¹	Construction and agricultural equipment	Investment in on-shore production capability	Complete by 2018	£150m investment in new site; 2500 direct jobs	UK - in-house	N/A
Heritage carpet manufacturer ²	Textiles	Repatriation of in-house production	2012	£3m upgrade investment in UK site, 43 direct jobs	UK - in-house	China - in-house
Caldeira ³	Textiles - home	Repatriation of in-house production	2012	20 new jobs	UK - in-house	China - in-house
Paper Cup Company ³	Paper cups	Repatriation of in-house production	2012	New manufacturing site, 2 new jobs	UK - in-house	China - in-house
RDM Group ³	Automotive component	Repatriation of off-shored production to in-house	2014	25 jobs, £400,000 new site developed	UK - in-house	China - subcontracted production
Laxtons ³	High quality worsted yarn	Repatriation of off-shored production to in-house	2010	£150,000	UK - in-house	Europe - subcontracted production
Swan Mill ¹	Low cost tinsel	Repatriation of off-shored production to in-house	2013	£320,000 in machinery	UK - in-house	China - subcontracted production
Vent-Axia ³	Domestic fan production	Repatriation of off-shored production to in-house	2013	35 direct jobs, invested £350,000 in machinery and additional building development	UK - in-house	China - subcontracted production
Raspberry Pi ³	Low cost starter computer	Component sourcing via contract manufacturers	2012	No direct investment	UK - subcontracted production	China - subcontracted production
Hornby ¹	Toy manufacture	Component sourcing via contract manufacturers	2012	No direct investment	UK - subcontracted production	China - subcontracted production
Technology Manufacturer ²	Product line to be 3D printed locally	Component sourcing via contract manufacturers	2013-planned	Investment in 3D printing	UK - subcontracted production	Far East - subcontracted production
Pump manufacture ²	New product line	Temporary repatriation of component sourcing	2009	No direct investment - extension of existing UK contract	UK - subcontracted production	China - subcontracted production
Patrona Luggage	Luggage	Repatriation of production from China	2012	No direct investment	UK - Subcontracted production	China – subcontracted production
Phineas Group	Plastic shoe hangers and display products	Repatriation of production from China	2015	Obtained a £100,000 grant, opened a new factory.	UK – in-house, but automation facilitated the reshoring.	China – subcontracted production

Note: ¹Web searches and media reports; ²Existing research data (interview); ³Sourced from ReshoreUK webpage

Table 5: Reasons for Reshoring, UK Firms

Drivers	Push	Pull
Cost-based	Increasing labor rates, Energy and transportation, Associated employment, Freight movement costs	Productivity improvements (skills, automation, process innovation)
Flexibility-based	Long delivery cycles, Large and stable order quantities	Supply capacity; Demand responsive manufacture
Market-based		Access to markets, Infrastructure, Brand value
Risk-based	IP theft, Supply chain disruptions, Inconsistent quality	
Speed-based		Technology, Product and process innovation, Co-location of design and manufacture

Source: Compiled by authors based on interviews, media searches and existing research data

ⁱ While there are multiple organizations promoting reshoring including those that track the activity and provide case studies, Reshoring Initiative provides more comprehensive data on reshoring activities, including the information on new foreign direct investment (FDI) and kept from offshoring (KFO) for the authors to discern. Their data are extracted from published articles on the subject of reshoring excluding increases in the US manufacturing due to market expansion. In addition of extensive internet searches, they occasionally acquire data from primary sources via conversations, interviews or prints only materials, which are recorded in their database with names of sources cited. All source material is entered into the Reshoring Initiative Library which is later extracted and entered by the data entry team into 32 data fields including company, industry, reasons for reshoring, etc. The organization also extracts the data on a quarterly basis, format, clean and compare multiple data sources to create up-to-date data on each company. They then analyze the data and create the tables, graphs, and Library Data that are made available to the public via their data reports.