Creating New Paths? Offshore Wind, Policy Activism, and Peripheral Region Development

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Key words:
path creation
evolution
offshore wind
peripheral region
policy

abstract

This article extends economic geography research on path creation by developing a conceptual framework that moves beyond existing firm-centric accounts and connects to a wider array of actors and multiscalar institutional contexts that mediate the emergence and development of growth paths. As part of a broader understanding of social and institutional agency, the approach specifically redresses the apparent neglect of the multiple roles of the state and public policy interventions in research on path creation. The framework is used to interpret more than 30 years of path-creation activities that have placed the peripheral region of North East England at the forefront of the United Kingdom's burgeoning offshore wind sector. The empirical findings reveal how a variety of path-creation mechanisms have served to shape, and be shaped by, successive causal episodes of complex and geographically situated social agency. Emerging from an episode of entrepreneurial activity, the path's creation was subsequently catalyzed by a decade of strategic and contextual regional policy intervention before a radical restructuring of economic development governance in the United Kingdom created a policy vacuum for the path's development. The analysis of the policy-on, policy-off episodes illustrates the potential agency of evolutionary inspired policy interventions in supporting mechanisms of path creation and reveals a varied set of implications for the cohesion and embeddedness of the path's development.

90(1):91–112. © 2013 Clark University. www.economicgeography.org

Acknowledgments

I thank the editor and the three reviewers for their helpful comments in the preparation of this article. Thanks also to Andy Pike, Danny MacKinnon, Koen Frenken, Ron Boschma, and Jurgen Essletzbichler for advice on an earlier version of this paper presented at the AAG Annual Conference 2012.

As part of the recent "evolutionary turn" (Coe 2011) in economic geography, much attention and debate have focused on the concept of path dependence (inter alia Martin 2010; Mackinnon et al. 2009; Coe 2011). Yet, despite always being "latent in the process of path dependence" (Martin and Sunley 2006, 407), it is fair to say that economic geographers' understanding of path creation has not kept pace. This is especially surprising, given that the "question of how new regional growth paths emerge has repeatedly been raised by leading economic geographers . . . as one of the most intriguing and challenging issues in our field" (Neffke, Henning, and Boschma 2011, 241).

However, recent advances have been made that situate path creation within more open and dynamic understandings of path dependence and local industrial evolution (Simmie and Martin 2010). In particular, by bringing together the previously neglected importance of place and social agency, economic geographers have developed a richer and clearer appreciation of the ways in which the emergence of a new industry may be enabled or constrained by environments and contexts that are conditioned by assets and competences inherited from previous local paths (Martin 2010). Although these advances have been helpful in identifying the ideal-type settings for path creation at the conceptual level, the challenge still remains to specify further the contexts of "enabling" or "constraining" environments and to establish greater clarity and specification of the causal factors that explain the creation and geographic diversity of new paths. This is not to advocate for a "regressive search for the ultimate cause of path creation" (Martin and Sunley 2006, 427), but it does suggest that analyzing the mechanisms, agents and conditions underpinning the geographies of path creation should remain at the top of the agenda for research in this field (Sydow, Lerch, and Staber 2010, 190).

In this sense, the contribution of this article is twofold. First, in this article, I argue that much can be learned about the creation and evolution of new growth paths through a broader perspective on the roles and types of social and institutional agency that are involved, especially the dynamic interrelationships between agents *within* and *beyond* firms (Pike et al. 2009). Given that a primary concern of evolutionary economic geography is to explore the "spatialities of economic novelty (innovation, new firms, new networks)" (Boschma and Martin 2010,

23), conventional understandings of path creation are seen predominately as a firm-led process, driven by the microlevel search and selection behaviors of knowledge-intensive firms and networks responding to purely market branching and selection processes (Mackinnon et al. 2009). As a result, most conceptual and empirical analyses of path creation has been drawn, understandably, from advanced technology regions with high levels of adaptive capacity. This historical focus of path creation research raises more than simply the well-rehearsed call to move beyond a narrow set of empirical case studies; it has also served to frame, even constrain, the analytical frameworks of studies of path creation (Morgan 2012). Therefore, this article contributes to the recent progress made in understanding candidate mechanisms for stimulating new paths of growth (Martin and Sunley 2006; Boschma and Frenken 2009; Neffke et al. 2011) by developing a fuller and clearer integration of firm-level analysis set within the mechanisms' broader and territorially varied institutional contexts (Garud and Karnøe 2003; Gertler 2010; Simmie 2012).

Second, in broadening economic geographers' understanding of social and institutional agency, I specifically address the apparent neglect of the multiple roles of the state, quasi-state, and local and regional policy interventions in mediating the creation and unfolding development of paths. I think that existing approaches continue to fall short in meeting the need to "examine the strategic decisions made by policy-makers, including the nation state, if we are to properly understand regional path creation" (Martin and Sunley 2006, 427). As Cooke (2010, 10) stated, even with some of the most successful cases of regional path creation in advanced regions, the mechanisms involved "are not purely market branching processes but are significantly intermediated by regional agencies." On the other hand, for the very reason that peripheral regions lack market-led adaptive capacity, identified in many studies of path creation, they have long been the objects of state-led policies to stimulate institutional change, promote innovation, or delock negative trajectories (Pike, Dawley, and Tomaney 2010; Boschma and Martin 2010). However, exemplified by, although not restricted to, a peripheral region perspective, it would appear that researchers still have "little understanding of how regions diversify into new growth paths, and to what extent public policy may affect this process" (Asheim, Boschma, and Cooke, 2011, 894).

In addressing these gaps, the article develops a conceptual framework for a fuller identification and understanding of the roles and interrelationships of agents, mechanisms, and regional assets that have forged the North East of England's leading role within the burgeoning offshore wind sector in the United Kingdom. Having installed its first demonstration sites in 2000, the United Kingdom has accelerated into the world's largest market of offshore wind, with over half the European-installed capacity (see Table 1) and growth projected to generate £19 billion ($28.9 billion) per year and 250,000 jobs by 2050 (Carbon Trust 2010).

The case of the peripheral region of North East England is particularly important because it reflects more than 30 years of path creation and development activity, heralded in 2010 by the then Prime Minister Gordon Brown (cited in Jupp 2010, 1), as indicative of "an area which had a shipbuilding industry which was renowned throughout the world. Now again we have the opportunity to lead the world from the North East . . . . Offshore wind is a new industry where Britain can be number one in the world . . . and the North East is at the forefront in providing the skills, expertise, and enterprise to capitalise on this rapidly expanding market . . . (and) . . . thousands of green jobs."

Accordingly, the conceptual and empirical contributions unfold across five sections. First, I develop a conceptual framework in which path-creation mechanisms are understood as being mediated by a multifaceted social agency, historically and

Table 1

European Offshore Wind Market 2012: Installed Capacity by Nation

	U.K.	Denmark	Belgium	Germany	Netherlands	Sweden	Finland	Ireland	Norway	Portugal	Total
No. of farms	20	12	2	6	4	6	2	1	1	1	55
No. of turbines	870	416	91	52	124	75	9	7	1	1	1,662
Capacity installed (MW)	2,947.9	921	397.5	280.3	246.8	163.7	26.3	25.2	2.3	2	4,995

Source: European Wind Energy Association (2013).

geographically conditioned by unfolding and multiscalar socioinstitutional contexts and power relations. Second, I present analyses of how the interplay of local entrepreneurial activities and state-sponsored strategic niche management served to create a regional "demonstration effect" through which the North East's path of growth was created. Third, I detail how this emerging path was subsequently catalyzed by a period of deliberative and strategic regional policy activism, serving as a key historical moment in shaping the quantitative and qualitative dimensions to the path's trajectory. Fourth, I analyze how the path's trajectory has been altered by radical changes to the governance of economic development in the United Kingdom that have combined to create a local and regional policy vacuum at a time of enhanced interregional competition for offshore wind investment.

Local and Regional Industrial Evolution and Path Creation

Early accounts viewed the creation of new paths of growth as the result of historical accidents or chance (see Krugman 1991) or as serendipitous products of "windows of locational opportunity" provided by the generic properties of new technologies offering enhanced locational freedoms (Boschma and Frenken 2006, 290). While suited to ex post analyses, such approaches were deemed to offer a relatively ambiguous, "passive" (Cooke 2010), and "voluntarist" (Mackinnon et al. 2009) understanding of the uneven geography of the formation of new paths. In recent years, as part of the broader focus on path dependence in economic geography, attention has increasingly focused on the roles played by history and place in understanding geographies of path creation, suggesting that—among other place-dependent economic and social variables—"the pre-existing industrial structure of a region or locality does have an influence on whether a particular new industry develops there" (Martin 2010, 6). For a while, however, traditional equilibrist notions portrayed path dependence—and the way that history mattered—as a constraining process, serving to emphasize continuity, rather than change, in the evolution of the economic landscape (Martin and Sunley 2008). In particular, although path dependence helped explain how paths become structured—or indeed "locked in" to particular trajectories—it offered little understanding of the ways in which paths are actually created. It also fostered a binary understanding of stylized trajectories, between adaptive and high-growth regions and region that are locked in to declining technologies and institutional structures (Martin 2010).

Although subsequently critiqued as overly static and reductionist, these developments stimulated economic geographers to explore how regions adapted to avoid lock in or could become delocked to create new paths (Martin and Sunley 2006). Moreover, as part of Martin and Sunley's (2006, 407) increasingly open and dynamic notion of "path as

process," path creation became understood as part of the "ongoing, never ending interplay of path dependence, path creation and path destruction." The relationship between path creation and path dependence was also made clearer. Path creation became a latent element of path dependence, conditioned by an array of local industrial-technological legacies and place-dependent factors and therefore helping to explain why particular paths have grown in particular places but not in others.

These ideas have been subsequently integrated into a series of more systemic mesolevel approaches to local and regional industrial evolution, inspired by notions of adaptive systems, focusing on the interplay between local and regional institutional structures and broader technological and market-selection pressures (Simmie and Martin 2010). In accordance with Figure 1, Martin (2010) identified candidate phases that are involved in the creation of new paths: a *preformation* phase dominated by preexisting economic and technological conditions, a *path creation* phase in which there is experimentation but also competition between different economic agents and a *path development* phase based on local increasing returns and externalities. Martin's (2010) necessarily stylized approach helps identify how the transition between preformation and path creation requires the identification, harnessing, and conversion of local conditions to match new market opportunities. Analogous to the idea of regional assets from the global production networks (GPNs) approach (Coe and Hess 2011), these historical and place-based characteristics could involve natural and material resources; surpluses of capital, skills, knowledge, enterprise, technology, and innovation capacity; and more informal conventions and networks.

However, understanding how these dynamics are either enabled or constrained by the local environment remains a key challenge, with Martin's use of the layering, conversion,

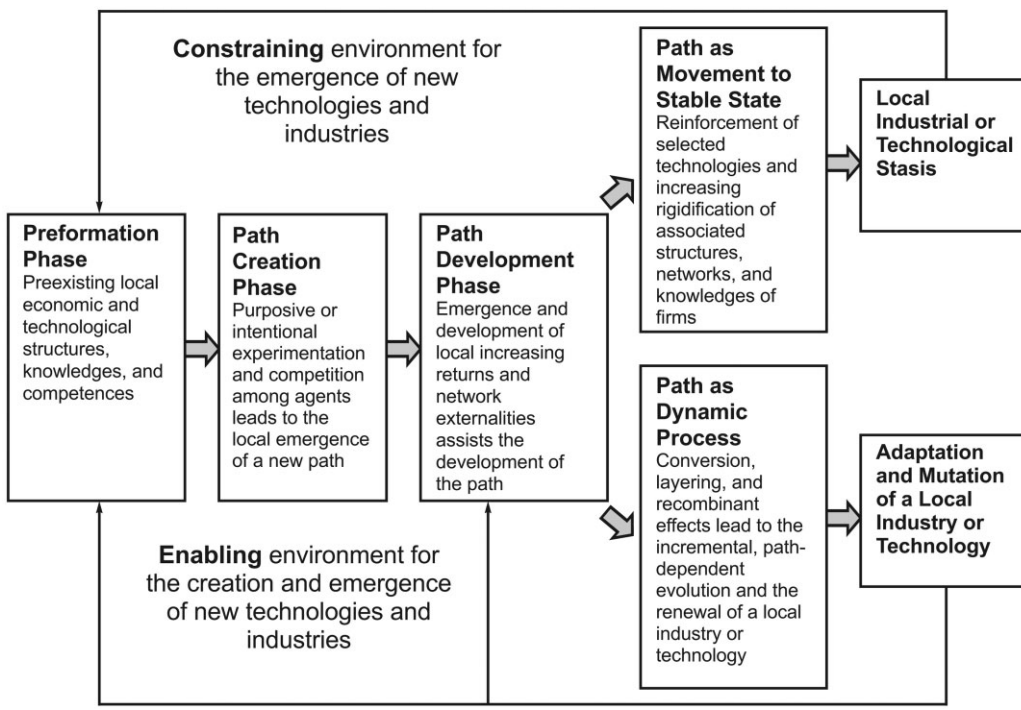

Figure 1. Toward an alternative model of local industrial evolution.
Source: Martin (2010, 21).

and recombination of social and institutional contexts and resources remaining conceptually abstract and difficult to operationalize empirically (Cumbers, Dawley, Mackinnon, and Pike 2013). Even so, with clear parallels to ideas related to adaptive cycles (Simmie and Martin 2010) and cluster life cycles (Menzel and Fornahl 2010), this alternative model is helpful in conceptualizing and framing path creation within a more open, dynamic, and enabling notion of path dependence (see Figure 1).

However, the model still leaves many analytical and empirical issues of causality and agency in path creation unresolved. First, for analytical clarity, researchers need to be clear by what we understand actually to be evolving—regional economies, clusters, or sectors—and therefore the sorts of paths that are created (Fornahl et al. 2012). Second, understanding path dependence as a more open and enabling process, localities and regions that possess high levels of absorptive capacity and dynamic local innovation systems are those that are most likely to enable path creation (Martin and Simmie 2008). Conversely, it is also known that "in other places—precisely for the reasons arising from the specifics of their past economic development—the local environment may be less conducive to, perhaps even a "constraining force" on, the emergence of new technologies and industries" (Martin 2010, 20). The geographic variation in path creation processes therefore raises the important challenge of understanding how localities and regions can move from being constraining to being enabling environments. Third, to establish greater clarity and specificity of the causal factors involved, the approach developed in this article seeks to delineate more effectively the key actors and mechanisms that shape, and are shaped by, the broader enabling or constraining environments.

Mechanisms of Path Creation: Conditions, Agency, and Actors

Attempts to unravel the precise mechanisms through which new paths are created have recently focused on two sets of ideas: delocking and path branching. Martin and Sunley's (2006) path as process approach identified a range of mechanisms or scenarios through which regions may adapt and avoid negative lock-in trajectories (see Table 2). Although born out of the binary distinction between lock-in versus modernization and renewal, several of the candidate mechanisms are relevant to path creation theory and policy

Table 2

Escaping Regional Lock-in: Some Potential Scenarios

Sources of New Path	Characteristics
Indigenous creation	Emergence of new technologies and industries from within the region that have no immediate predecessors of antecedents there
Heterogeneity and diversity	Diversity of local industries, technologies, and organizations promotes constant innovation and economic reconfiguration, avoiding lock-in to a fixed structure
Transplantation from elsewhere	Primary mechanism is the importation of a new industry of technology from elsewhere, which then forms the basis of a new pathway of regional growth
Diversification into (technologically) related industries	Transition in which an existing industry goes into a decline, but its core technologies are redeployed or extended to provide the basis of related new industries in the region
Upgrading of existing industries	The revitalization and enhancement of a region's industrial base through the infusion of new technologies or the introduction of new products and services

Source: Martin and Sunley (2006, 420).

(Simmie, Martin, Carpenter, and Chadwick 2008). One possible mechanism is through indigenous creation, with the emergence of new technologies and industries from within the region possessing no immediate connections to preexisting trajectories of competences. Here attention falls on such candidate factors as startups, links to higher education institutes, and research institutes, and pools of human capital but says little about causality and the geographic variations that are involved. In contrast, new paths may emerge and establish around the transplantation of new technologies, firms, and industries into a region from exogenous sources. Traditionally associated with the varying success of peripheral region strategies to attract and embed flagship inward investment projects (Dawley 2010), it also connects to an emerging literature in which the evolution of economic landscapes is understood in relation to broader extra-regional dynamics, such as GPNs (Coe 2011; Mackinnon et al. 2009). Thus, alongside the largely endogenous factors that are associated with much of the literature on path creation, the emergence and development of a new path may be mediated, as much if not more, by the matching of regional assets to the strategic needs of transnational corporations or focal firms within a GPN. Evoking elements of Massey's (1995) rounds of investment and spatial divisions of labor approach, Mackinnon (2012) usefully explored how the matching and harnessing of regional assets interplay with GPNs by forging processes of coupling and decoupling over time, across space and in place.

Finally, Martin and Sunley's (2006) diversification mechanism—the transition of declining industries into new technologically related sectors of growth—makes a clear connection to the importance of place-based contexts and competences, suggesting that path creation is a latent element within ongoing processes of path dependence (Simmie, Martin, Carpenter, and Chadwick 2008). Even so, identifying the key actors and mechanisms—both *within* and *beyond* the confines of the firm—through which diversification occurs, in certain regions and at certain times, requires much more work.

In parallel, albeit closely linked to ideas of diversification, a whole body of work within evolutionary economic geography has formed around the concept of related variety and path branching (Boschma and Frenken 2011). A crucial point is that when a region's sectors are neither overly specialized nor diverse, but are instead related in terms of technological fields and knowledge bases, they possess related variety (Boschma 2009). For Boschma, the existence of related variety within a region's industrial base is argued to foster interactive learning and knowledge spillovers that stimulate the generation of novelty and branching. Notions of related variety therefore align closely with evolutionary perspectives in that "the industrial history of regions, and in particular the parts of technology space their portfolios inhabit will affect the ways regions create new variety over time, and how they transform and restructure their economies" (Neffke et al. 2011, 241).

The formation of new paths that are grounded in related activities occurs through the process of branching, either as a new sector growing out of an old sector or as a new sector emerging from a recombination of the technology and knowledge of a range of existing sectors (Boschma and Frenken 2009). Four mechanisms have been identified through which knowledge maybe transferred between related sectors and stimulate branching: the diversification of firms (e.g., new products, mergers, and acquisitions) entrepreneurship (e.g., spin-offs and startups), labor mobility (between firms and sectors), and social networking (e.g., professional associations). The causal connections of history and related variety are central in these mechanisms. For example, firms tend to diversify into technologically related areas and are therefore shaped by their histories and technological portfolios. Here, important connections can be made between the dynamics of technological relatedness and the well-established focus on entrepreneurs as key

agents in the deliberate and "mindful deviation" into new paths (Garud and Karnøe 2001, 2003). From an evolutionary perspective, entrepreneurs draw on and mobilize existing knowledge, experience, networks, and resources in an attempt to transition between old and new paths (Martin and Sunley 2006). To date, however, research on path branching and related variety has been situated at the aggregate level of regional sectoral profiles and expressed through quantitative methods (Coe 2011). Although this approach has been extremely valuable in the development of evolutionary analysis, its proponents have also recognized the "strong need to determine through which mechanisms the process of path branching operates" in stimulating new regional growth paths (Neffke et al. 2011, 261).

Therefore, while the delocking and path-branching mechanisms offer important analytical insights, the challenge remains to gain a better understanding of their causality. In particular, it requires situating the existing firm-centric approaches within the broader institutional contexts and sets of social relationships that shape the creation of paths (Mackinnon et al. 2009). At one level, I seek to gain a better understanding of how mechanisms of path creation are mediated by a multifaceted social agency, open to a much broader set of potential actors operating across and within firm and nonfirm contexts (Garud and Karnøe 2003). At another level, I address an area that has frequently been overlooked in research on path creation by exploring how the strategies and agency of key actors are historically and geographically conditioned by wider political economic contexts and extra-regional relations (Mackinnon 2012; Coe 2011). Specifically, the article begins this challenge by broadening the analytical lens to capture the potential roles of state and quasi-state institutions as causal agents in the mechanisms of path creation and development.

State Agencies and Policy Intervention

As part of the long tradition of research on the roles of national governance systems and regional policy strategies within local and regional development, path creation continues to be considered implicitly rather explicitly (Mackinnon et al. 2009; Morgan 2012). To date, therefore, much policy prescription has been derived from the field of local and regional innovation studies, in which the dynamics of the system mediate actors' "relative capacities to generate new pathways or renew old ones" (Martin and Simmie 2008, 189). Put simply, local and regional innovation systems consist of a critical mass of organizations (including research institutes, universities, development agencies, and financial institutions) that supplement a firm's absorptive capacity—an ability to value, assimilate, and apply new knowledge—through the provision of inputs into the innovation process (Cohen and Levinthal 1990). However, framed by path-dependent processes of industrial evolution, it is known that the strength and effectiveness of local and regional innovation systems are geographically varied (Cooke 2010). In particular, Boschma (2009) suggested that the problems in peripheral regions are more than simply market failures in the generation of adaptive capacity and encompass structural and institutional failures in the innovation system.

Although exemplified by, but not restricted to, peripheral regions, the perspective developed in this article explores more explicitly the influence of state agency and public policy in intervening and mediating the contexts and mechanisms of growth paths. While recognizing that "it is not just strategic agency among entrepreneurs that is important in path creation" (Martin and Sunley 2006, 426), there remains a clear need for more research that seeks to uncover the various ways, forms, and levels of success in which state actors, such as policy makers, attempt to implement strategic agency and mindful

deviation from established paths (Garud and Karnøe 2001). In particular, this article extends two dimensions. First, it draws on evolutionary perspectives that focus on the importance of a "contextual view" of policy intervention, whereby "the degree and nature of policy intervention should be different in regions because their histories differ . . . [and] be based on the institutional history of a region and which type of intervention fits better a region's situation" (Boschma 2009, 19).

The emerging interest in the policy implications of notions of related variety and path creation suggest that rather than start from scratch, policy intervention can assist regional branching by supporting new sectors that have their roots in the regional knowledge base and technological field (Neffke et al. 2011). The policy prescription is to take the history of each region as a starting point "when broadening the region's sector base by stimulating new fields of applications that give birth to new sectors" (Asheim et al. 2011, 899). Although the precise implications for operational policies remain vague, these perspectives suggest that the agency of policy intervention may be realized in stimulating the mechanisms of transferring knowledge (e.g., entrepreneurship, networks, and diversification) that are involved in the path-branching process.

Second, the conceptual framework recognizes that while it is important that the emerging policy prescriptions and options are attuned to the historical and geographic specifics of particular regions, equal attention must also be paid to the often-limited capacities of policy makers to stimulate and mobilize agents to establish new growth paths (Mackinnon et al. 2009; Morgan 2012). Therefore, although notions of place dependence rightly direct attention to local conditions of path creation (Martin and Sunley 2008), the approach also recognizes that these factors are both historically and geographically conditioned by national state strategies and wider political economic contexts and sociospatial relations (Coe 2011). For example, the evolution of the offshore wind sectors in Denmark, and more recently in northern Germany, has been explained, in part, by a combination of national-level "strategic niche management," including shifting energy policy, public-sector research and development (R&D) initiatives, and strategic action at the subnational scales to provide positive conditions for path creation and development (Cooke 2012; Fornahl et al. 2012). I argue that a fuller appreciation of how the key agents, mechanisms, and processes of path creation may be influenced, shaped, or constrained requires a multiscalar approach that is sensitive to the interrelationships among local, national, and international policy contexts and actors that shape the geographic evolution of localities and regions (Gertler 2010; Pike et al. 2009).

In this article, this conceptual framework is operationalized to interpret and explain the interplay among mechanisms, agents, and regional assets in the emergence of the offshore wind industry in the peripheral region of North East England. The findings are derived from a mixed-methods approach that was designed to trace back and delineate the key causal agents and mechanisms involved in more than 30 years of path-development activities. The predominately qualitative research design sought to complement the emerging empirics of evolutionary economic geography that are largely quantitative (Boschma and Frenken 2011; Cumbers et al. 2013). The guiding principle was the need to "get inside" the process and causality of path creation through a close dialogue with key agents and organizations in their institutional, sectoral, and spatial contexts (Clark 1998; James 2006). The research involved more than 20 in-depth interviews with key actors, past and present, representing firms and nonfirm organizations, identified as part of a backward extension of an institutional and organizational mapping exercise, akin to a genealogical approach (Martin 2000; Pike et al. 2012).

The mapping exercise and analysis more generally, were supported by the interrogation of historical secondary data (e.g., the corporate literature, strategy documents, local and national government reports, and media articles). This approach is fully consistent with the evolutionary analysis, recognizing that the research was designed according to a temporal or longitudinal logic focusing on processes of change and adaptation over time (Pike et al. 2012). Together, the empirical findings support the analytical value of seeking to unravel and make sense of longer-term processes by identifying key causal episodes, historical moments even, of social and institutional agency, that themselves shape and are shaped by the creation and evolution of the path. When possible, the empirical analysis is supported by summary secondary quantitative data to help position the North East's growth path relative to broader trends. However, the rapid emergence of the offshore wind industry has meant that, to date, the sector has not been accurately captured in standard industrial classification data in the United Kingdom, a situation that hinders subnational and national comparisons of employment and investment levels (United Kingdom Commission on Employment and Skills 2011). The data are further complicated by the frequent data aggregation of the separate offshore and onshore wind industries, together with the firms operating across a broad portfolio of engineering functions that are not exclusive to offshore wind.

Episode I: Entrepreneurship, Niche Management, and Early Path Creation of the Offshore Wind Sector in North East England

In 2000, the Blyth Offshore Wind farm, in North East England, consisting of 2 megawatt turbines one mile offshore, became the United Kingdom's first offshore wind project. Although symbolic in "putting the North East at the forefront of this embryonic sector in the UK" (interview with the director of energy and innovation of One North East, hereafter ONE 2010), the project represented the latest element of more than 20 years of path-creation activities in the region.

The antecedents of the Blyth Offshore Wind farm can be traced back to 1979 with the formation of the Northumberland Energy Workshop (NEW), a small workers' cooperative that drew together a variety of engineers and scientists who were recruited mainly from Newcastle University and local marine engineering industries. For almost a decade, NEW provided specialist inputs into a series of onshore wind energy projects, led by global firms, such as Shell and BP, within both the United Kingdom and Spain. However, indicative of the importance of market incentives and national framework conditions (Martin and Sunley 2008), NEW ceased operations in 1989. As a former manager of NEW (interview 2010) stated, "There was no market, there was no government focus on what we were doing. Instead the wind energy policy of the Thatcher government was about giving work to large companies like McAlpine and Taylor Woodrow to building very large onshore wind turbines that would become white elephants, whilst Denmark focused on smaller turbines that would become mass production."

In contrast, by 1990, the importance of state-led technological and market niches in the emergence of new paths became evident (Simmie 2012). A small amount of the national Non-Fossil Fuels Obligation (NFFO) consumer levy—hitherto exclusively used to develop nuclear energy initiatives—was now allocated to pilot projects in renewable energy. In response, four former members of NEW founded a new commercial venture—Border Wind—to pursue the new niche-market opportunities in North East England. Inspired by the then-recent development of the world's first off-

shore wind project in Vinedby, Denmark, Border Wind was successful in securing a power purchase contract from NFFO, together with project assistance from the European Union structural funds, to develop a semi-offshore wind farm along the harbor pier of Blyth. Completed in 1992, the Blyth Harbour Windfarm became the first demonstration project of its kind in the United Kingdom, "when few people were thinking about offshore wind, either in the UK or globally" (interview with the director of energy and innovation, ONE 2010).

In the mid-1990s, Border Wind submitted a further proposal to develop the United Kingdom's first truly offshore wind farm project off the coast of Blyth. At this juncture, the role of experienced entrepreneurs in processes of path creation is instructive (Asheim et al. 2011; Garud and Karnøe 2003). David Still, the founder of Border Wind, and former NEW worker, was neither an engineer nor a scientist but a self-styled "entrepreneur and project developer" (interview 2010), especially in cultivating important political networks and relationships with clients to foster strategic niche management (Martin and Sunley 2008). Toward this end, Still cultivated national political support by becoming the chairman of the British Wind Energy Association and began talks with the state-controlled Crown Estate, the owner of the U.K. seabed and vested partner in any pilot offshore wind project.

Consequently, the Blyth Offshore Wind Farm received significant political support from the U.K. government's Department for Trade and Industry and the energy secretary, allowing Border Wind to acquire "a power purchase contract when nobody else was even thinking about offshore wind, so there was no category to even apply for, but they made it happen" (interview with the founder of Border Wind 2010). To deliver the project, Border Wind collaborated with a variety of extra-regional sources, including large energy (Powergen and EON) and offshore and marine (Shell and AMEC) companies, to provide the requisite resources, skills, and finance to the project. In the case of AMEC, a global engineering services company with a presence in the North East's oil and gas sector, the project would eventually lead to an acquisition to form AMEC Border Wind. The acquisition of Border Wind allowed AMEC to begin the branching process as "one of the first oil and gas providers to expand into wind energy and to respond positively to the government's recently announced commitment to developing wind energy projects" (AMEC 2000).

The account of the Blyth Offshore Wind Farm demonstrates the roles of key entrepreneurial actors—recombining knowledge, capabilities, and networks—in fostering strategic niche opportunities for the creation of the offshore wind sector in the North East region (Garud, Kumaraswamy, and Karnøe 2010). In providing a broader perspective on the roles and types of agency involved, the approach used here reveals how the purposive economic and political activities and mechanisms of key local and regional actors were initially constrained, but ultimately enabled, by national-level policy decisions and institutional environments (Martin and Sunley 2006; Simmie 2012). Moreover, in the chronology of path development, the activities in this episode provided the necessary seedbed for subsequent periods of policy activism and intervention (Asheim et al. 2011).

Episode II: Policy Activism and Path Emergence of the Offshore Wind Sector in North East England

The early demonstration effect of the Blyth Offshore Wind Farm was subsequently incorporated into an episode of purposive and strategic regional policy activism to

support and embed the North East's emerging path of growth in the offshore wind sector. The approach developed in this article allowed me to identify and unravel the key actors, mechanisms, and assets that were involved in this period and to reveal it to be a key historical moment in stimulating and shaping the unfolding trajectory of the path. In particular, I show how policymakers, among others, can serve as key agents, even entrepreneurs, in stimulating mindful deviations from established paths (Garud and Karnøe 2003; Cooke 2012).

Following the election of the Labour Government in 1997, a new approach to regional governance and policy emerged, principally the formation of Regional Development Agencies in each of England's nine regions in 1998 (Hudson 2011). The North East's development agency, ONE, implemented a new strategic vision for the region, moving away from the failed model of cost-based inward investment to a more knowledge-driven, indigenously oriented, approach and thus "flipping the industrial economy on its head" (interview with a former sector manager of ONE 2010). The North East's emerging offshore wind sector became a central component of this concerted period of strategic policy activism. In particular, as part of the vision of ONE's Strategy for Success to create an "enabling environment" (Martin 2010) for offshore wind, two particular sets of policy interventions emerged: R&D and technological development and diversification and transplantation (Boschma 2009; Asheim et al. 2011).

R&D and Technological Development

In developing a new regional economic strategy, ONE commissioned consultants to review the region's research and technological capabilities in relation to emerging markets (Hudson 2011). The exercise was predicated on the region's poor performance in R&D expenditures, half the U.K. average, reflecting the evolution of a branch plant economy accentuated, "in part, by a lack of government funding for R&D in the region. The R&D capacity the region once had in formerly nationalized sectors, such as gas, shipbuilding, and mining, had now gone following privatization. Without any significant private-sector R&D, the region is left with only universities . . . not a very diverse innovation system" (interview with the director of energy and innovation, ONE 2010).

The consultants identified the region's academic strengths and the technological relatedness of existing offshore fabrication and high-value engineering as offering an opportunity to connect with the emerging renewable energy market. However, to capture this potential, the region would have to tackle the "innovation paradox" (Oughton, Landabaso, and Morgan 2002), whereby a strong academic research base is poorly matched to regional industrial needs through a limited absorptive capacity and weak intermediary institutions (Goddard, Robertson, and Vallance 2012).

ONE attempted to overcome these challenges, akin to Boschma's (2009) system failures in the innovation system, through the development of the Strategy for Success, the largest innovation program implemented in any of the English region's at £200 million ($305 million) over 6 years. Of particular relevance to the role of historical and place-based assets in the path-creation literature, the Strategy for Success was designed to "develop, based on existing strengths, leading expertise . . . in emerging technologies for growing markets, and their exploitation" (Simmonds and Stroyan 2008, 3).

Consequently, the New and Renewable Energy Centre (NaREC), a company limited by guarantee, was developed to be the focus for a new sector-based Centre for Excellence, driven by an initial funding allocation of £10 million ($15.2million) and a mission to become a world leading R&D test facility. NaREC focused on developing capital and infrastructural assets "in order to develop technologies of a certain type in offshore wind,

you need big scale facilities, big demonstration prototypes as a key part of the evolutionary process . . . . you need these types of institutions, not to act as intermediaries between Universities and business but to develop the technology to the next level, we didn't have those in the UK . . . but there was no market mechanism for it and Government didn't understand the problem, but ONE did and NaREC came explicitly from that" (interview with the head of strategic economic change, ONE, 2010).

In a prime example of the recombination of regional assets, NaREC was located in Blyth following the acquisition of a series of dock and shipbuilding infrastructures, including a large-scale offshore and marine test facility, previously owned by the nationalized gas industry. NaREC's location was also clearly influenced by the presence of the Blyth Offshore Wind Farm, a crucial factor that linked the "demonstration effect" of the early path-creation phase with the ensuing period of policy activism (Simmonds and Stroyan 2008).

By 2010, ONE had invested £30 million ($45.6 million) in the core funding and infrastructure development of NaREC, leveraging a further £150 million ($228.3 million) in capital investment from national, European Union, and private-sector funding. Central to these developments was the creation of a 150-strong specialist workforce operating "a facility unique in global R&D terms, establishing the UK's offshore wind technology testing and demonstration hub in North East England" (the CEO of NaREC, quoted in ONE 2010).

With more than £30 million of central government funding allocated to projects in 2009–10 alone, NaREC's position within the broader, and still embryonic, U.K. offshore wind sector became increasingly prioritized. As part of the central government's review to establish a new industrial policy around technical innovation centers, NaREC was identified as an, albeit rare, U.K. success story and blueprint for future policy, citing its global client base, R&D collaborations with more than 10 countries and its status as the world's largest onshore physical test asset base for offshore wind (Hauser 2009).

Transplantation and Diversification

Given that, "NaREC was about technology development not a cluster body" (interview with the former business development director of NaREC, 2010), ONE developed a parallel industrial strategy for offshore wind, focusing on the two interrelated candidate mechanisms of path creation: transplantation and diversification (Martin and Sunley 2006; Neffke et al. 2011). To drive these policy interventions, ONE purposefully recruited into the state agency a small team of business development practitioners from the region's energy and engineering sectors (interview with the head of strategic economic change, ONE, 2010). Indicative of the importance of "knowledgeable agents" (Simmie 2012, 756) and their role in recombining expertise from existing sectors (Boschma and Frenken 2009), the team's industrial experience privileged an understanding of the emerging offshore wind market as being "very similar to the opening up of North Sea oil and gas in the 1970s; it's a programme of similar complexity, scale, and capital investment, and the North East built 70 percent of oil and gas platforms in the U.K. North Sea, so we've got a track record in doing this kind of stuff" (interview with the manager of energy and environment, ONE, 2010).

Furthermore, the team's professional networks made them aware that although an appetite to diversify already existed in the region's marine-related industries, there remained the need for institutional leadership and a strategic focus, led by state agencies, to support the appropriate mechanisms of growth (interview with the director of the Northern Trade Union Congress, 2010).

In terms of transplantation, and connecting to Mackinnon's (2012) attempts to forge links between evolutionary approaches and GPNs, a core element of the Strategy for Success was to harness NaREC as a regional asset to forge strategic couplings with lead global firms and ultimately attract the "holy grail" of a wind turbine manufacturer (interview with the former director of business development of NaREC, 2010). In 2007, U.S.-based turbine manufacturer Clipper Wind announced its decision to locate its European Centre for Excellence in Blyth. The Centre for Excellence represented the first stage in the $65 million (£42.7 million) Britannia Project eventually to manufacture the world's largest wind turbines, at 10 megawatt in the North East region. However, by unpacking the role of key agents and institutions within the transplantation mechanism, Clipper's decision to invest in the North East reveals a broader set of social and institutional processes forging the strategic coupling with the region. First, embodying the locational inertia of entrepreneurs (Boschma 2009), the managing director of Clipper's new European division was David Still, the founder of the former Border Wind and a key actor in the emergence of the offshore wind sector in the North East. As the CEO of Clipper noted, "I was the internal champion with local knowledge of the region's asset. We made a decision to be here due to proximity to market and the key relationships that I had with the central government and ONE who were very proactive in making it happen. We're not just here because NaREC's test facilities are here; we don't have to be located next to them to use them" (interview, 2010).

Second, drawing on, even recombining, the North East's experience and institutional capacity in attracting foreign direct investment (FDI) (Mackinnon 2012), Clipper's investment reflected more than two years of investment-promotion activities by the central government and ONE, including the traditional repertoire of funding and infrastructure support. By 2010, Clipper had received more than £10 million ($15.2 million) of direct state funding, and through ONE's use of NaREC as "a funnel for government funds," was able to access indirect support, for example, the provision of a drive-train test facility that was an essential requirement to locate in the region (interview with the CEO of Clipper, 2010). With Clipper's Centre of Excellence established in Blyth, the second stage of the investment program involved developing a blade and turbine plant, with an initial workforce of 500, aiming to produce 100 Britannia turbines per annum. Clipper invested in Newcastle, on a former shipyard on the banks of the river Tyne that had been adapted in a program of activities led by ONE to convert and recombine infrastructural assets as part of a "fight to keep industrial land for the benefit of industry," rather than to be lost permanently to nonindustrial developments (interview with a former sector manager of ONE, 2010). For Shepherd Offshore, a private sector landowner that provided Clipper with a purpose-built port-side facility, this investment reflected the latest episode of more than 30 years of business activity in the North East that has focused on "acquiring redundant shipyards, remediat[ing] them, and creat[ing] the conditions for new investment, [as] we did previously with oil and gas, offshore fabrication, and subsea technologies. But you have to follow the market and be willing to move into different industries, through which you leverage your assets" (interview with the business director of Shepherd Offshore 2010).

In contrast to transplantation, a separate strand of policy activity served to encourage firms in related sectors to diversify and branch into the offshore wind market. By extending existing firm-centric approaches, the analysis demonstrates the important ways in which policy practitioners can bridge the firm- and market-selection mechanisms by supporting the transfer of knowledge between related sectors (Asheim et al. 2011; Boschma and Frenken 2009). Diversification policy, including raising market awareness among related industries as diverse as the manufacture of military tanks and legal and

insurance companies, primarily targeted the oil and gas and offshore fabrication sectors, recognizing that "sub-sea engineering and oil and gas exploration have been part of the North East for a long time, so the offshore wind sector and the competences required to install 5–6 megawatt turbines in the North Sea is not a new concept for many companies with roots in offshore marine applications and services. The vast majority of companies that supply products to the offshore wind industry have historically done so for oil and gas" (interview with the former sector manager of ONE 2010).

Accordingly, ONE held individual meetings and consultations with more than 60 firms in the region and undertook broader supply-chain events in an attempt to raise market awareness and support for diversification. Although counterfactual evidence may exist to suggest that these firms might have diversified on the basis of market signals alone, the findings reveal the critical role played by ONE in stimulating some of the largest diversification projects in the region's emerging sector (interview with the CEO of TAG Engineering, 2012), serving to connect skills and infrastructures from the region's oil and gas (for example, Heerema and McNulty) and steel (Corus) sectors to make jackets, platforms, and monopoles for the support structures of offshore wind turbines. By 2010, together with transplantation investments, North East–based firms had delivered more than £300 million ($456.6 million) of offshore wind contracts, making the North East the leading region in the United Kingdom (interview with the manager of energy and environment of ONE, 2010).

Episode III: Shifting Policy Contexts and Path Development of the Offshore Wind Sector in North East England

After a decade of pioneering, strategic and "contextual" policy support (Asheim et al. 2011), by 2010 the North East's offshore wind sector became exposed to a radical rescaling and rescoping of policy intervention. In a stark illustration of the importance of connecting path-creation processes to wider political economic conditions and structural contexts (Mackinnon et al. 2009; Mackinnon 2012), a policy vacuum emerged for the North East at a time of enhanced interregional competition for industrial investment in the rapidly expanding offshore wind market. This section explores the impact on the path's development of a clear rupture and turning point in the institutional context and enabling environment that was previously active in supporting the mechanisms of path creation and emergence.

Hollowing Out an Enabling Environment: A Policy Vacuum?

A year after the election of the Conservative-Liberal coalition government, OneNorth East, as with all regional development agencies, was abolished in 2011. The demise of ONE brought with it the termination of the role of the Strategy for Success as a central pillar in stimulating the region's offshore wind sector. By 2012, as part of the centralization of U.K. science and industry policy, NaREC's regional missions was replaced by its new role as the operational center for the United Kingdom's new £50 million Technology and Innovation Centre for Offshore Renewable Technology, to be coordinated by a United Kingdom-wide consortium of stakeholders, focused primarily on Scottish Enterprise (2012) and headquartered in Glasgow. Although it is too early to judge the precise implications for the North East, NaREC's new national mission appears to be emblematic of a longer-term divergence between its high-level R&D and

testing functions with extra-regional clients and the absorptive capacity of the industrial and engineering base emerging from industrial diversification and transplantation (interview with the vice chair of North East Local Enterprise Partnership, LEP, 2011). In this sense, NaREC's specialist role within the offshore wind value chain created an almost "enclave-like" function within the emerging path, "they are a provider of specialist, even intangible, test services, and their clients are some of the biggest names in the industry but you do have to separate that from economic development for the North East" (interview with the former technology manager, ONE, 2011).

The North East's policy environment was also hollowed out from below as part of the abolition of ONE, with two new subregional LEPs replacing the former single regional tier of policy. Geographically, the organizational restructuring divided the emerging offshore wind activities in the southern Tees Valley subregion from those in the remaining portion of the North East region, including the Newcastle and Blyth regions. In terms of capacity, ONE's skilled and experienced team that drove the region's transplantation and diversification activities was disbanded. Without the statutory authority of the former regional development agencies, the embryonic LEPs provide a new policy environment with much more limited resources and capacity for strategic policy intervention in promoting the North East's offshore wind activities (House of Commons 2012). Following the withdrawal of policy interventions of the scale and scope used during earlier phases, the evolving development of the North East's growth path requires a fuller appreciation of how the key agents, mechanisms, and processes are increasingly influenced, shaped, and potentially constrained by their wider institutional contexts and extra-regional relations (Mackinnon et al. 2009).

Interterritorial Competition and Transplantation

Withstanding a variety of geographically specific factors that limit the location freedoms of the offshore wind industry (for example, proximity to wind farms and port-related facilities), the evolving geography of investment is being increasingly shaped by territorial battles for FDI that are reminiscent of previous rounds in such sectors as automotives and electronics (Mackinnon 2012; Dawley 2010). In particular, as the market opportunities to deliver 40 gigawatts of offshore wind energy to the United Kingdom by 2030, equivalent to more than 5,000 turbines, has become increasingly understood (Carbon Trust 2010), the first mover advantages of the North East's proactive policies in the 2000s have been increasingly met by a series of reactive policy responses from localities and regions that are seeking to catch up.

Within the broader U.K. context of attracting inward investment, the radical restructuring of the architecture of economic development governance of England's regions exposed a significant institutional deficit and power geometry with the key business investment funds and bodies retained by the devolved Scottish government (Bolger 2011). Together with an aspiration for achieving an all-renewable-energy market by 2020, Scotland's aim of capturing the "R&D of all the big offshore wind turbine players" has been supported by attracting large-scale investments from leading transnational corporations, such as Gamesa, Doosan, and Mitsubishi (Scottish first minister, quoted in U.K. Offshore Wind 2011). In England, the North East is also increasingly pitched against latecomer localities that are seeking to capture opportunities for transplantation within the burgeoning offshore wind market. For example, after courting 110 possible locations in the United Kingdom and Europe, including 3 sites in the North East, Siemens announced its decision to invest £80 million ($121.8 million) in a wind turbine manufacturing plant on a disused dock site in Hull, in the Yorkshire and Humber region,

creating 700 jobs. In contrast to the North East's path, until the Siemens investment, Hull had little track record in offshore wind-related activities but instead responded to an opportunity of an FDI-led entry into the rapidly developing market. Siemens's decision combines factors, such as the proximity to North Sea wind farms and the allocation of £20 million ($30.4 million) of U.K. government funds to upgrade the relatively unique scale of port infrastructure available in Hull (interview with the director of economic development of the Hull City Council 2011).

As part of the transplantation mechanisms of path development, the North East also witnessed the so-called dark side of the differential power relations involved in establishing strategic couplings between lead firms within GPNs and host communities (Coe and Hess 2011). Following liquidity problems in 2010, U.S.-based Clipper was acquired by the U.S. conglomerate United Technologies, and in the following year roundup, it withdrew from the European offshore wind market. As a result, in 2011 Clipper terminated its Britannia Project and, with it, the loss of 1,000 projected jobs following the closure of its R&D facility in Blyth and the United Kingdom's first wind turbine plant in Newcastle. In contrast to the policy activism phase, the diminished power and agency of local and regional institutions to "recouple" (Dawley 2010) the facilities, skills, and infrastructure to a new round of investment served to illustrate the altered role of transplantation as a mechanism for the path's ongoing development. Indeed, despite the perceived importance of relatively unique regional assets offered by the North East for offshore wind investment, the example of Clipper provided a stark reminder of the potential fallibility of inward investment within peripheral regions relative to the increasingly embedded mechanisms of diversification and recombination for the path's development.

Diversification and Branching

Despite the rupture between the policy-on and policy-off episodes, the strategic interventions of ONE prior to 2010 proved important in catalyzing and cementing the mechanisms of diversification, branching, and recombination on which the path's trajectory has become dependent (Neffke et al. 2011). In terms of institutional support for diversification activities, elements of recombination can be identified as private-sector actors seek to redefine their roles and adapt to altered and much-depleted resources, especially those that were previously provided by state and quasi-state agencies (Martin 2010). EnergiCoast was formed in 2011 as a business-led offshore renewables representative group whose membership represents £400 million ($609 million) of investments in offshore wind projects and employs 6,000 workers. Demonstrating a degree of institutional conversion, EnergiCoast is a derivative of NOF Energy, a former North East–based offshore oil and gas cluster group and now a national body for the energy sector. Moreover, EnergiCoast is chaired by TAG Engineering, a company that diversified into the offshore wind sector as a direct response of ONE's former business-support initiatives. In a clear legacy of the previous phase of policy activism, EnergiCoast's core mission is to support the mechanisms of diversification to harness the relatednesses offered by the region's sectoral, infrastructural, and labor market assets (interview with the chairperson of EnergiCoast, 2012). The strength of this mechanism for the development of offshore wind in the North East is clearly demonstrated by estimates suggesting that more than 250 companies, based in the North East, are either already operating in the offshore wind market or have a strong potential to diversify from existing activities (North Eastern LEP, 2011). For example, in 2011, located in a former shipyard next to the cancelled Clipper blade factory, Offshore Group Newcastle (OGN), a local firm, created 1,000 jobs to produce jacket structures for offshore turbines. Demonstrating the

importance of technological relatedness and regionally rooted knowledge transfer to the survival of diversifying firms (Boschma and Frenken 2011), OGN's management team originally converted the former shipyard to produce oil and gas platforms during the boom years of the 1980s and 1990s and has since branched into the renewables markets as part of opening up a mixed portfolio of market opportunities (Hill 2011).

Conclusions

This article contributes to recent advances in economic geography that pay renewed attention to the role of path creation as a latent element within more open and dynamic understandings of path dependence and local industrial evolution (see Martin 2010; Simmie and Martin 2010; Boschma and Frenken 2011). More specifically, the conceptual and empirical findings offer a series of important insights for the flourishing field of evolutionary economic geography in terms of understanding the interplay between diverse forms of social and institutional agency and the mechanisms of path creation. By taking the challenge of exploring the complex interstitial effects that may stimulate or enable growth paths seriously (Martin and Sunley 2008), the article moves beyond firm-centric accounts by better capturing the multifaceted nature of the social and institutional agents that are involved in the mechanisms of path creation. In particular, by recognizing the potentially important role of extra-regional actors and relations, such as national governmental policy or focal firms within GPNs, I have redressed the tendency of existing approaches to abstract notions of key actors, mechanisms, and local contexts from the broader socioinstitutional settings and power relations that envelop, regulate, and mediate their activities (Coe 2011; Mackinnon 2012).

In so doing, I have presented an analytical framework that aims to distinguish and better understand the key mechanisms, agents, and regional assets that are involved in path-creation activity and provide additional operational clarity to studies of broader notions of enabling or constraining environments (Martin 2010; Pike et al. 2010). Connecting to broader notions of local industrial evolution that emphasize the dynamics of "path as process" (Martin and Sunley 2006), the analytical framework sought to identify and delineate key historical moments through which social and institutional agency have influenced the nature and character of the emerging growth path. As a result, the approach demonstrates the ways in which unfolding paths open up episodes for engagement and intervention in which purposive social agency can influence the quantitative and qualitative character of emergent paths and their trajectories (Pike et al. 2012). The article also illustrates the important ways in which qualitative research can capture the causality of the social and institutional processes that shape and operate within mechanisms of path creation and therefore provide complementary analyses to much of the work that has explored mechanisms of path creation and branching that have focused on aggregate and quantitative approaches (Coe 2011; Boschma, Minondo, and Navarro 2012). The value of the conceptual approach that was developed was revealed through its application to understanding more than 30 years of activity in path creation and development the offshore wind sector of North East England.

First, the article demonstrated the importance of capturing the varied and often overlapping forms of deliberative social agency, within *and* beyond the firm, that serve to shape, and be shaped by, their position and relationships within multiscalar institutional environments and frameworks (Garud et al. 2010; Martin 2010). The analysis restated the importance of understanding the roles of "experienced entrepreneurs and diversifiers" (Boschma and Frenken 2009, 11), in both firms and policy organizations, in identifying, harnessing, and matching regional assets to new market opportunities as part

of path creation (Garud and Karnøe 2003). Although not restricted to a peripheral region perspective, in the case of the North East, examples of early-stage entrepreneurialism and the ability to valorize latent regional assets in offshore wind were necessarily mediated and enabled by forms of "niche management" offered by national political support or direct policy intervention (Cooke 2012). In so doing, the findings support the conceptual value I have placed on the incorporation of policy actors and interventions, across multiple scales, within the analysis of path creation (Fornhal et al. 2012; Essletzbichler 2012). At one level, national regulatory institutions and policy architectures have been critical in providing the broader technological and market conditions for the industry's growth and in determining the changing capacity and form of economic development institutions that are involved in supporting and embedding the path in the North East. At another level, this article has supported the importance of regionally embedded interventions that reflect the institutional and industrial history of the region (Boschma et al. 2012; Neffke et al. 2011). Specifically, the analysis of key historical moments also raises the prospect that policy interventions may offer various forms of agency at different stages or episodes in the early stages of the path (Asheim et al. 2011). The rupture of the policy-on, policy-off episodes reveals the important ways in which the North East's path was catalyzed and strengthened by a broad and intensive program of regional contextual policy support that is tied to principles emerging from evolutionary policy prescriptions (Boschma 2009). The subsequent removal of ONE's strategies to foster an enabling environment, as part of a radical restructuring of national policy frameworks, exposed the North East's growth path to a more open form of interregional competition for investments in offshore wind. As important for the North East, however, the analysis has revealed that the scope of local and regional actors to develop and apply contextual policy interventions (Boschma 2009) are continually shaped by the political economy of the U.K. state and the power geometries of its governance of local and regional economic development (Mackinnon et al. 2009). For path creation in peripheral regions, which are potentially more reliant on state-led interventions to stimulate adaptive capacity and growth (Martin 2012), a more explicit grasp of the different kinds and degree of power that shape evolution in economic geography is needed (Pike et al. 2009, 180).

Second, a central contribution of this article has been to respond to the challenge of providing a deeper exploration and understanding of the often-overlapping mechanisms of path creation (Boschma et al. 2012; Neffke et al. 2011; Sydow et al. 2010). I have extended existing firm-centric accounts by illustrating how policy interventions and practitioners can play important roles in the socioinstitutional processes and transfer of knowledge that shape and mold transplantation and diversification mechanisms (Boschma and Frenken 2009). I have also raised the previously neglected qualitative dimension of path-creation mechanisms, in that the ways in which they mold and shape the character, cohesion, and position of emerging path's within industrial structures, value chains, and production networks need to be better understood (Mackinnon 2012; Cumbers et al. 2013). In the case of the North East, the findings support the increasingly recognized value of industrial diversification and branching as a basis for more embedded, broader-based, and sustainable paths of growth (Boschma and Frenken 2011). In contrast, NaREC's development, as part of one of the largest innovation support programs in the English regions, provided an R&D asset of global significance for a peripheral region, but given the limited absorptive capacity of the industrial base, increasingly developed an "enclave role" within the region's broader offshore wind path. Despite an attempt to forge a strategic coupling between the "regional asset" of NaREC and the turbine manufacturing base of the region's growth path, the transplantation and rapid disinvestment of Clipper illustrated the importance of recasting notions of the

creation and emergence of paths within broader extra-regional contexts and power relations (Coe 2011; Mackinnon 2012). Taken together, however, the case of the offshore wind sector in North East England is also suggestive of the important, albeit complex and temporally varied, ways in which mechanisms may overlap and support each other in the creation and emergence of growth paths. Although further adding to the difficulties of drawing general conclusions from an evolutionary analysis that is sensitive to place and history, a better understanding of the interrelationships among mechanisms would appear to be an important conceptual and policy-related challenge.

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