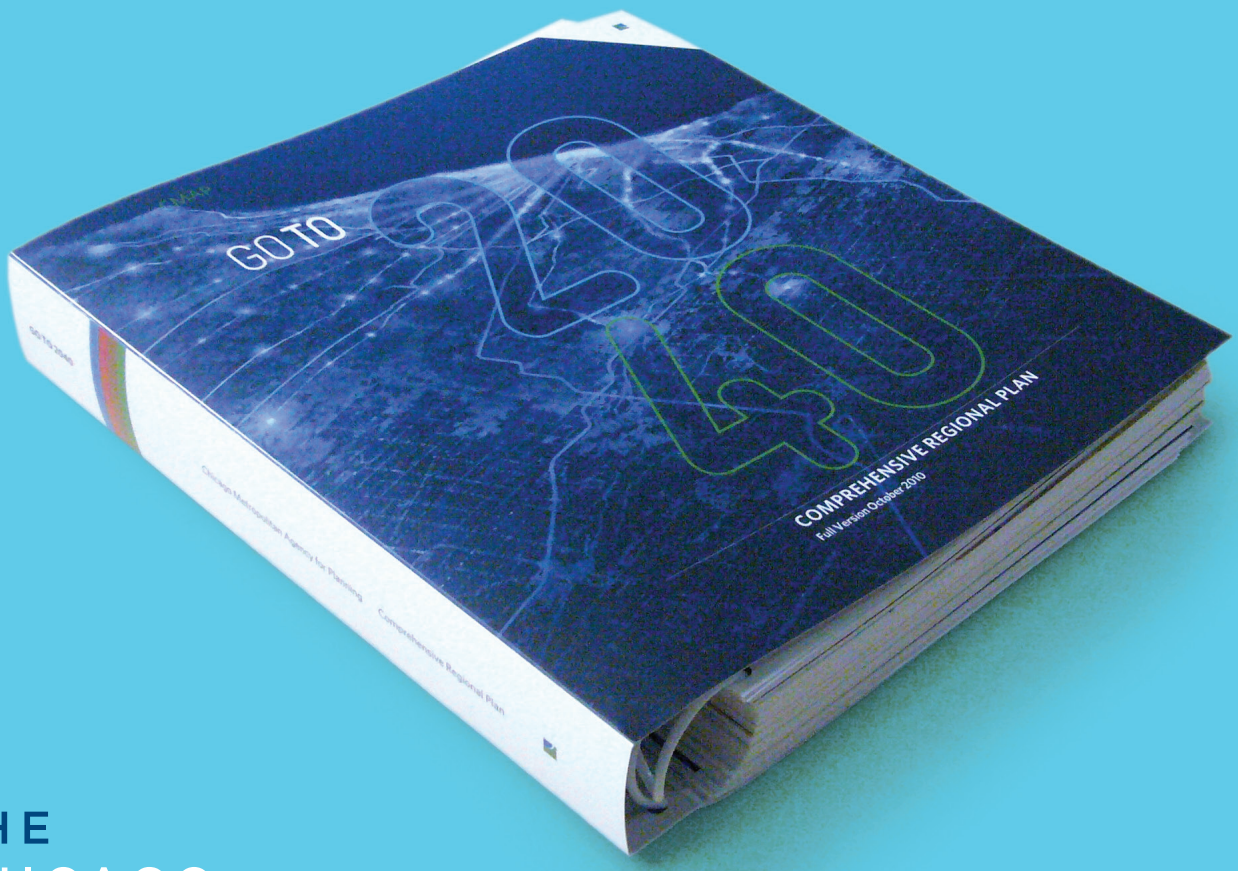
Economic Impacts of GO TO 2040



THE CHICAGO COMMUNITY TRUST

AND AFFILIATES

by Gretchen Kosarko and Robert Weissbourd
RW Ventures, LLC | January 2011

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January 21, 2011

Back when The Chicago Community Trust signed on as a partner with the Chicago Metropolitan Agency for Planning in January 2008 to support and actively engage in the development of the GO TO 2040 comprehensive regional plan for the Chicago area, no one anticipated the magnitude of the Great Recession that has resulted in the loss of over seven million jobs nationally and almost half a million in the Chicago region alone. The job losses have led to other crises, including foreclosures and reduction of public services affecting the economic security and safety net of thousands of individuals and families in our region. Consequently, creating a road map to strengthen the regional economy and position the Chicago region to be more economically successful has become even more urgent as the major goal for the development of the GO TO 2040 plan.

Recognizing the importance of the GO TO 2040 plan for the Chicago region's economic recovery, the Trust commissioned RW Ventures to conduct an assessment of the economic impacts of GO TO 2040. RW Ventures was selected because of its expertise in developing market-based strategies for regional and community economic development. For the last three years, RW Ventures has been working with the Brookings Institution to develop regional business plans and promote federal policies which can be more supportive of regions, the economic engines of our nation today. The co-authors of this report have deep experience and roots in the Chicago region. Robert Weissbourd founded RW Ventures, is a Nonresident Senior Fellow of the Brookings Institution Metropolitan Policy Program where he works on the Metropolitan Economy Project, and has been active for over 25 years in local and national economic development work. Gretchen Kosarko, senior associate, previously served as the Director of Research for World Business Chicago and a Project Manager for S. B. Friedman & Company, a Chicago-based real estate and urban planning consulting firm.

The Trust is pleased that this *Economic Impacts of GO TO 2040* report confirms the important economic values of the plan. For over 95 years, The Chicago Community Trust has worked with donors, non-profit organizations and public agencies to improve quality of life for our communities' residents. We hope readers of this report will join The Chicago Community Trust and the Chicago Metropolitan Agency for Planning in our effort to implement the GO TO 2040 Plan recommendations. The Plan strengthens the development of the Chicago region as a major global economic center. Available at www.cmap.illinois.gov/2040, the Plan strengthens the development of the Chicago region as a major global economic center.

Ngoan Le
Vice President of Program
The Chicago Community Trust

Preface and Acknowledgements

This report applies an economic lens to the Chicago Metropolitan Agency for Planning's GO TO 2040 Plan, exploring how its recommendations can be anticipated to influence performance of the regional economy.

Over the last several years, CMAP has performed an enormous amount of work in crafting the plan, supplementing in-house resources with third-party expertise on key policy areas. The plan is informed by extensive research, including over 50 background reports, as well as by a far-reaching, inclusive visioning process that engaged thousands of citizens and leaders. This report is built upon, and would not have been possible without, this foundational work which gave rise to the plan. We are grateful for all of that work, much of which is cited throughout this report, and to those who did it.

Special thanks to CMAP and its Board for all of their extraordinary work, and for supporting this project. Key leadership of CMAP participated in the development of this report. Randy Blankenhorn and Bob Dean provided critical guidance on the Plan's vision and intent, as well as valuable feedback throughout. Brett Baden offered invaluable advice for the research and analysis conducted by our team. The whole CMAP team generously provided key data and information needed for our independent review of the GO TO 2040 Plan. We appreciate the active engagement of CMAP leadership to insure that this report is well informed by the work of the GO TO 2040 Plan.

The Chicago Community Trust, our region's community foundation, and particularly Terry Mazany, President and CEO, and Ngoan Le, Vice President, have been key supporters of CMAP, of development of GO TO 2040 and of this project. This includes the critical and generous financial support without which none of this work can get done. More importantly, it includes the vision, guidance, organizing and advocacy which inform and elevate the work and ultimately drive its success. The Chicago Community Trust has long been — and continues to be — an ardent supporter of development initiatives at the neighborhood and regional level, for which we and the larger economic development community are extremely grateful.

A host of researchers assisted with literature reviews and otherwise provided drafting, input and comments for sections of the report. We are grateful to Peter Plastrik, Joseph Grant, Rebecca Solomon, Emily Metz, Michael Ford, Sophie Cohen and Sohair Omar for their insights and enormous contributions.

Very substantial parts of the framework and analysis about regional economies included in this report — including particularly the identification and analysis of key leverage points for regional economic growth — were and continue to be developed jointly with our colleagues at the Brookings Institution's Metropolitan Policy Program, particularly working on a national project on "regional business planning." Beyond these project-specific contributions to this report, Brookings has long provided extraordinary leadership in the realm of metropolitan development, dramatically advancing the field in both the academic and policy arenas. We are particularly grateful to Bruce Katz, Amy Liu, Mark Muro and Sarah Rahman — all extraordinarily committed and talented contributors to the field of regional economic development.

We have the good fortune of working closely with colleagues at the George Washington University Institute of Public Policy on a distinct project on regional economies, aspects of which have informed this project. The spatial efficiency chapter in particular draws heavily on the work of that project, and we have benefited greatly from their insights on the topics of clusters, governance and the dynamics of regional economic growth. Our special thanks go to Hal Wolman, Andrea Sarzynski, Alice Levy and Diana Hincapie. We are also very grateful to the Surdna Foundation for its intellectual leadership and financial support for that project.

Finally, we are grateful to CMAP for use of CMAP/Trust resources for assisting in the preparation and layout of the report.

Gretchen Kosarko
Robert Weissbourd
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Executive Summary

The economy of the Chicago metropolitan region has reached a critical juncture. On the one hand, Chicagoland is currently a highly successful global region with extraordinary assets and outputs. The region successfully made the transition in the 1980s and 1990s from a primarily industrial to a knowledge and service-based economy. It has high levels of human capital, with strong concentrations in information-sector industries and knowledge-based functional clusters — a headquarters region with thriving finance, business services, law, IT and emerging bioscience, advanced manufacturing and similar high-growth sectors. It combines multiple deep areas of specialization, providing the resilience that comes from economic diversity. It is home to the abundant quality-of-life amenities that flow from business and household prosperity.

On the other hand, beneath this static portrait of our strengths lie disturbing signs of a potential loss of momentum. Trends in the last decade reveal slowing rates, compared to other regions, of growth in productivity and gross metropolitan product. Trends in innovation, new firm creation and employment are comparably lagging. The region also faces emerging challenges with respect to both spatial efficiency and governance.

In this context, the Chicago Metropolitan Agency for Planning (CMAP) has just released GO TO 2040, its comprehensive, long-term plan for the Chicago metropolitan area. The plan contains recommendations aimed at shaping a wide range of regional characteristics over the next 30 years, during which time more than 2 million new residents are anticipated. Among the chief goals of GO TO 2040 are increasing the region's long-term economic prosperity, sustaining a high quality of life for the region's current and future residents and making the most effective use of public investments. To this end, the plan addresses a broad scope of interrelated issues which, in aggregate, will shape the long-term physical, economic, institutional and social character of the region.

This report by RW Ventures, LLC is an independent assessment of the plan from a purely economic perspective, addressing the impacts that GO TO 2040's recommendations can be expected to have on the future of the regional economy. The assessment begins by describing how implementation of GO TO 2040's recommendations would affect the economic landscape of the region; reviews economic research and practice about the factors that influence regional economic growth; and, given both of these, articulates and illustrates the likely economic impacts that will flow from implementation of the plan. In the course of reviewing the economic implications of the plan, the assessment also provides recommendations of further steps, as the plan is implemented, for increasing its positive impact on economic growth.

Summary of GO TO 2040

GO TO 2040 is the culmination of over three years of public outreach, research, analysis and consensus building. This process resulted in extensive recommendations, each containing a series of specific implementation actions directed to a variety of organizations, meant to respond to the major challenges and opportunities facing the region. The plan seeks to address immediate concerns, such as the economic slowdown and its fiscal impacts, as well as long-term issues, such as continued population growth, demographic shifts and increasing scarcity of natural resources.

Implementation of the recommendations detailed in GO TO 2040 will change the characteristics of the region that affect economic growth — the "regional economic landscape" — in five principal areas:

- ***Transportation infrastructure***
  The recommendations in the "Regional Mobility" chapter prioritize investments in the region's roads, freight rail and transit system, streamlining the movement of goods and people within and through the region. The implementation actions reflect two key principles for prioritizing investments throughout the region: "fix it first," which emphasizes investment in already-developed (versus undeveloped) areas; and "do no harm," which focuses attention on mitigating incentives for an unsustainable pattern of development.

- ***Built environment***
  The recommendations in the "Livable Communities" chapter address enhancing the "livability" of the region's communities, with an emphasis on reinvestment, density, diversity of uses and income levels, walkability, access to transit, environmental integrity, smart design and development that fits each local context.

- ***Labor force and firms***
  Recommendations in the "Human Capital" chapter support development of a skilled workforce better matched to emerging jobs and creation of an innovation-enabling environment. Recommendations also begin to identify and support growth of key existing and emerging business sectors.

- ***Governance***
  Recommendations in the "Efficient Governance" chapter emphasize actions and policies to enable effective government execution and cooperation across the Chicago region, including cross-jurisdictional coordination, reform of the tax structure, and improving access to information.

- ***Quality of life***
  Finally, a number of GO TO 2040 recommendations whose primary effects are non-economic in nature will change characteristics of the region in ways which may indirectly enhance economic performance. These effects address regional quality of life, and fall into two categories: lowering household costs and enhancing regional amenities. In combination, the quality of life recommendations will make the region more affordable, environmentally sustainable and rich in the types of amenities that attract and retain residents and businesses. These are spread throughout the four chapters of the plan.

Economic Impacts of GO TO 2040

From an economic perspective, the regional scope of GO TO 2040 provides one of its key strengths. Metropolitan areas are a critical unit of geography in today's economy: they concentrate the nation's assets and, through the beneficial synergies associated with that concentration, disproportionately produce the nation's economic outputs. These synergies flow from interactions that largely occur through market and other systems that primarily operate at a regional scale of geography. Whether the goal is development of the neighborhood, the city or the suburb; human capital or business growth; one has to understand how the assets and markets intersect and relate across — and combine to constitute — the regional economy. Increasingly, it is metropolitan areas, rather than nations or individual cities, that are competing with each other in the global economy.

The changes in the regional economic landscape envisioned by GO TO 2040 will impact five core drivers of regional economic performance, as described very briefly below and at length in the full report.

GO TO 2040 will increase levels of innovation and entrepreneurship
The development of new products, services and systems that increase the productivity of businesses or spur the emergence of new markets has always been the primary source of productivity gains and long-term economic growth. Particularly in the knowledge economy, finding ways to more directly and deliberately foster innovation has become higher-priority for regional economic growth policy and practice.

Implementing the plan's recommendations will increase levels of human capital, intensify knowledge networks and spillovers, and enhance the institutional, cultural and funding environment, boosting innovation and entrepreneurship. In combination, these effects will increase firm productivity, formation and growth, as well as market development, the essence of regional economic growth.

GO TO 2040 will enhance the performance of existing and emerging clusters
Economic "clusters" are interdependent groups of firms and related institutions that gain benefits from their proximity and interactions. Clusters contribute to their firms' efficiency and productivity, and attract new firms, by reducing transportation and transaction costs, enabling shared labor pools and other inputs, and facilitating knowledge exchange, among other benefits.

The plan's recommendations concerning transportation infrastructure, labor force and firms, and governance will increase performance of all firms in the region through expanding access to suppliers, partners and customers; enhancing human capital; better aligning worker' abilities with employers' needs; supporting innovation; and improving the impacts of regional governance. Many of these interventions will particularly increase the productivity of firms in key existing and emerging clusters, and the plan also begins to focus on tailoring these types of interventions for specific clusters, particularly energy efficiency goods and services. Improved cluster performance directly translates to increased regional economic growth.

GO TO 2040 will improve the region's spatial efficiency
The geographic distribution of the region's economic assets — businesses and their suppliers, workers and consumers — and the infrastructure connecting them influence the efficiency and productivity of economic activity. Geographic proximity, density and accessibility determine transportation and transaction costs, and also influence the degree to which agglomeration economies are realized, such as the benefits of shared labor pools and knowledge spillovers.

The plan's excellent and particularly detailed recommendations on transportation and the built environment will enable a more efficient and productive flow of goods, people and ideas, reducing transportation costs for businesses and households; increasing labor market efficiency; facilitating knowledge exchange; and promoting the types of inclusive communities — mixed-use, mixed-income and transit-accessible — that enable deployment of all of the region's economic assets. The improved spatial efficiency of the region will grow the regional economy through both increasing inputs and reducing transaction costs, improving overall productivity and efficiency.

GO TO 2040 will develop and deploy human capital

Human capital — the knowledge, skills and expertise embedded in the labor force — is now the single most important input to economic growth. However, its impact on the economy depends upon its deployment, which entails having rich job pools through which it is attracted, retained and put to work, and efficient labor markets. Firms and workers attract each other in an iterative process, as thriving job markets attract skilled workers, and concentrations of skilled workers in turn attract additional firms.

The plan's recommendations will produce higher levels of human capital, better deployed in the economy, by providing higher-quality basic (P-12) education; increasing the levels and matching of human capital with job pools through community college and other training that is better aligned with employer needs; retaining and attracting human capital by supporting firm (and job) growth; and improving efficiency of labor markets by better aligning training, the workforce and jobs and by decreasing employers' costs of evaluating potential workers. Higher-skilled workers efficiently deployed in appropriately matched jobs will increase the productivity of existing firms and attract new firms, and so increase regional economic growth.

GO TO 2040 will improve governance to support private-sector economic activity

Government enables and influences private-sector performance by shaping fundamental aspects of the economic environment through the provision of infrastructure and other public goods; the nature of local tax and regulatory policy; and access to quality information for firm and household decision-making. One of the most complex challenges in driving regional economic growth is determining how government can support private-sector activity without displacing or distorting it.

Implementing the plan's recommendations concerning governance will leverage economies of scale in service provision, reduce inefficient inter-jurisdictional competition and provide more business value-added for taxes and more stable long-term funding for the public goods most valued by businesses and households — supporting a "high-road" economy. They will also improve the responsiveness of government programs and policies and reduce businesses' costs to identify and evaluate new market opportunities. In combination, these impacts will contribute to economic growth by enhancing productivity and aiding in attraction and retention of businesses and households.

GO TO 2040's impacts on these five drivers of economic growth are mutually reinforcing. In aggregate, they will lead to higher levels of human capital deployed in dynamic clusters; an enhanced innovation and entrepreneurial environment that drives more robust firm growth; more streamlined movement of goods and people; and coordinated governance that supports and enhances the performance of the economy.

Next Steps in Plan Implementation

The GO TO 2040 plan itself is perhaps best understood as a crucial landmark in an enormously ambitious and important ongoing undertaking to understand and influence performance of the myriad complex factors and interactions that drive the regional economy (as well as many other aspects of the region). The plan provides a vital roadmap and takes the critical first steps, but could not possibly describe all of the territory, let alone traverse it. There are many opportunities to expand upon the plan's recommendations and move forward. These opportunities are identified throughout the report, and could be addressed during plan implementation. They broadly fall into three categories.

- Plan implementation should more extensively and directly focus on and engage the private-sector business community to complement the current focus on government and households. This focus would lead to identification of more tailored strategies to strengthen particular business, occupational and functional clusters which drive economic growth; to improve workforce development and labor markets to match employers' anticipated human capital needs; and to design specific government activities enabling efficient and productive markets.

- Plan implementation should also include deeper analysis (better enabled by further engaging the private sector) of several aspects of the regional economy, in order to formulate more concrete, practical strategies for growth. A more nuanced understanding of the members of and dynamics within the region's industry, occupational and functional concentrations would provide a stronger foundation for developing cluster-specific growth strategies. Similarly, deeper analysis of the types and stages of innovation that present the most opportunities in the context of the current regional economy, including particularly of early-stage innovation and commercialization of technology, should inform more tailored next steps. Generally, GO TO 2040 provides solid analysis to begin identifying the right priority issues, but more rigorous analytic work and strategy development are needed to make these initial findings actionable.

- Finally, the scope of collaborative efforts recommended in GO TO 2040 should be expanded as plan implementation occurs, both in terms of the substantive issues addressed and the range of actors involved. Inter-governmental collaboration should include activities beyond planning and investment — particularly policy coordination on issues such as housing, taxes and land use and zoning — to help mitigate existing incentives for inter-jurisdictional competition. More tailored cluster-specific, human capital and innovation strategies and implementation require broader, cross-sector collaboration between firms, universities, investors, government and non-profit entities such as workforce development organizations, social service agencies and so on. This issue goes well beyond collaboration: it is the cornerstone for building a new institutional infrastructure better suited for economic growth in the current economy.

Conclusion

In the knowledge economy, regions are diverging with respect to economic performance as success builds upon itself. At this crossroads, it is more important than ever to act strategically and deliberately to foster regional economic growth. Successful regions have an institutional infrastructure that creates the ongoing capacity to take an integrated approach to economic growth, and to be flexible and adaptive in the face of changing market and economic circumstances. This entails open formal and informal networks and fluid coordination between the private, public and civic sectors.

The Chicago regional economy has enormous strengths, but we need this capacity to pay attention and to act in order to guarantee continued global leadership. The process of creating and beginning implementation of GO TO 2040 itself helps build this focus and key institutional capacity, and may be one of the plan's most important contributions. While much more work needs to be done, GO TO 2040 places the region firmly on the right path, and shows great promise, with respect to both the substance and process of generating continued regional prosperity.

Introduction

GO TO 2040,[1] the Chicago Metropolitan Agency for Planning's comprehensive plan for the Chicago metropolitan area, makes recommendations aimed at improving the standard of living in the Chicago region over the next 30 years. The recommendations were developed through a highly participatory process and reflect the values and future vision of the residents of the seven-county region. Addressing the priorities of a large and diverse region means that the recommendations must address multiple challenges, ranging from resource conservation and protection of open space, to land use patterns and infrastructure, to effective governance. In aggregate, the recommendations are designed to maximize long-term economic benefits and foster livable communities throughout the region by prioritizing policy changes, investments and changes in physical infrastructure.

CMAP's organizational history further informs the nature of the recommendations included in GO TO 2040. The agency was created in 2005 as the region's Metropolitan Planning Organization (MPO). Established as a merger of the Chicago Area Transportation Study (CATS) and the Northeastern Illinois Planning Commission (NIPC), CMAP is charged with regional land use and transportation planning, as well as forecasts of regional growth, housing, environmental integrity and natural resource protection, and multi-faceted evaluation of alternative future scenarios for the region.[2] GO TO 2040 addresses a more extensive range of regional issues than past plans, and its scope and "point of view" are more broadly concerned with the overall well being of the region, including its economic performance. Nevertheless, CMAP is a specialized governmental agency, primarily making recommendations with respect to government policy: in particular, it is not an economic development agency.

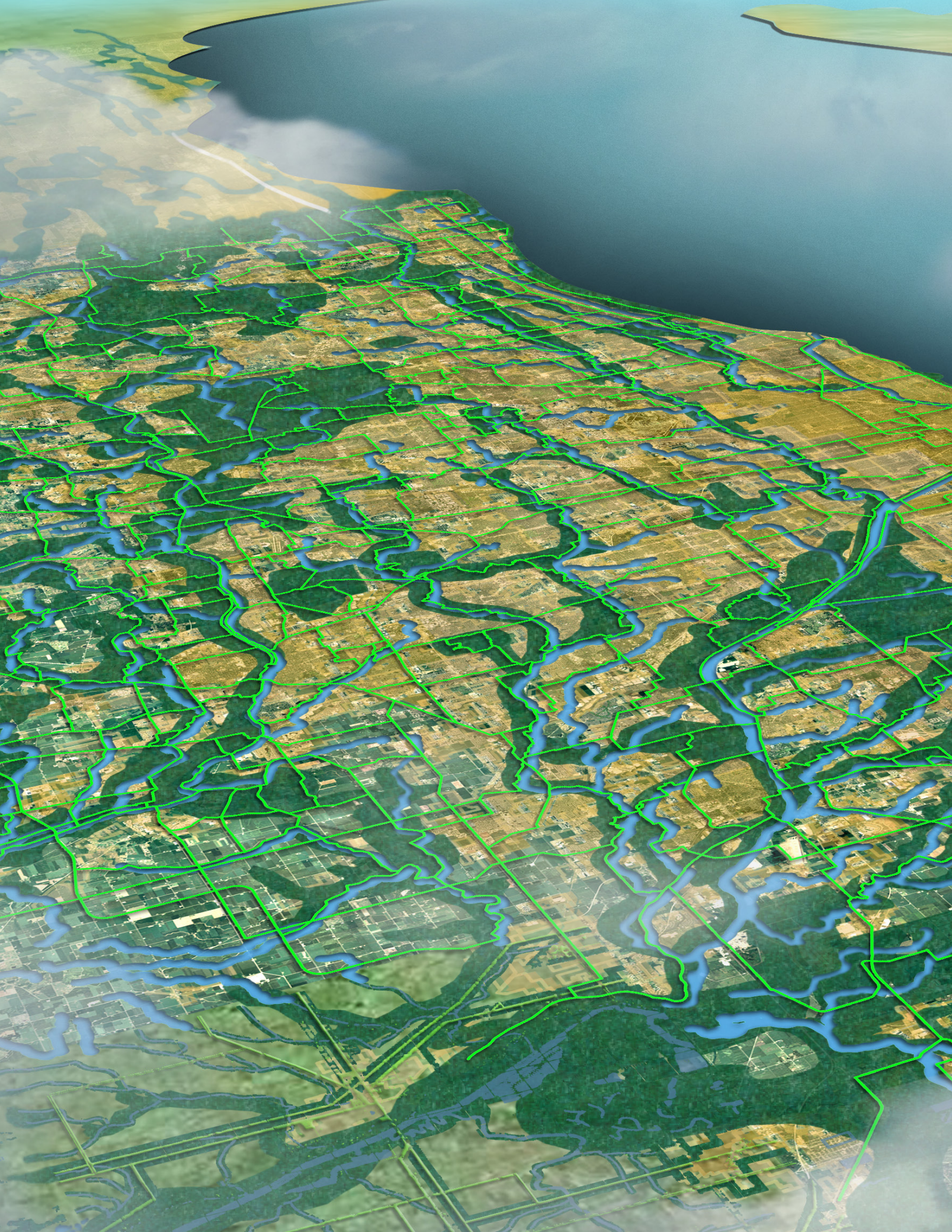
The Chicago Community Trust commissioned this report to examine the impacts that the recommendations contained in the plan can be expected to have on the economic future of the region. This entails two limitations in scope: it is only about the recommendations, and it is only about the economy. In other words, first, this report only examines aspects of the economy for which CMAP makes recommendations. While, as will be seen, the plan is thoughtfully designed and can be anticipated to have a very substantial positive impact on the region's economic performance, it is not intended to address all of the activities critical to strengthening the region's economy, many of which are beyond CMAP's jurisdiction (and so beyond the scope of this inquiry). Rather, the plan is crafted to supplement, support, enable and complement those other activities, many of which occur largely in the private sector, where long-term economic growth is ultimately produced.

Second, the focus here is on examining the GO TO 2040 recommendations solely from an *economic* perspective. The plan addresses a wide range of important objectives for the region, such as public health, environmental integrity and overall quality of life. These are of course critically important: indeed, from an economic perspective, they are fundamental preconditions — sufficiently clean air and water, a baseline level of public safety, and so on — to the existence of *any* level of economic activity in the region.[3] However, the focus of this inquiry is on the recommendations which might directly increase regional economic outputs — gross metropolitan product, employment and wages — which occur through growth in the number, size, productivity and efficiency of firms in the region.

In addition to direct economic impacts, the paper also highlights three types of secondary economic impacts. First, many of the recommendations will contribute to the economic resilience of the region: even if they do not directly influence growth, they will strengthen the economy by making it less subject to downturns in the face of outside shocks. Second, the report touches on the cost-saving effects many of the recommendations will have for households, potentially facilitating more economically productive consumption and investment. Finally, the report also addresses the degree to which the plan's recommendations may enhance the region's quality-of-life amenities that aid in attracting and retaining households and firms. In terms of the regional economy, these effects do not as necessarily translate into measures of economic growth, but they remain noteworthy for their potential contribution.

Finally, because GO TO 2040 recommends broad policy changes, rather than specific operational activities, the assessments of potential impact on the region's economy contained in this document are necessarily qualitative in nature. The report examines whether the recommendations are well tailored to strengthen and grow the regional economy, drawing on economic theory and empirical research. It examines how the GO TO 2040 recommendations will influence the key drivers of regional economic growth. Where possible, illustrative estimates of the possible magnitude of economic impact are provided by extrapolating from empirical research, but given the high-level nature of the recommendations, no quantitative research or conclusions could be provided here.

In order to undertake this analysis, Chapter I first describes how the high-level recommendations and more specific implementation actions can be anticipated to influence the underlying characteristics of the region which affect economic performance — the "economic landscape." Chapter II then briefly provides an economic framework for understanding regional economies, identifying the key drivers of regional economic growth that are affected by the plan. With this backdrop, it is then possible to examine how the changes in the characteristics of the region will influence performance of the regional economy through their impact on each of these drivers, specifically with respect to innovation (Chapter III), business clusters (Chapter IV), spatial efficiency (Chapter V), human capital (Chapter VI), effective governance (Chapter VII) and through indirect impacts (Chapter VIII).



CHAPTER 1:
How GO TO 2040 Will Change the Economic Landscape

The recommendations that comprise GO TO 2040 address a diverse range of issues that are important to the future of the region, ranging from water conservation to workforce development. From the economic point of view, implementing these recommendations will affect five broad characteristics of the region which in turn influence economic performance:

- Transportation infrastructure
- Built environment
- Labor force and firms
- Governance
- Quality of life

The relevant recommendations and their influence on each of these regional characteristics are briefly described below. The more detailed implementation areas embedded in the recommendations are further discussed as appropriate in subsequent chapters.

Characteristic 1: Transportation Infrastructure

Together, this group of recommendations prioritizes investments in the region's roads, freight rail and transit systems. They call for transportation system improvements to streamline the movement of goods and people within and through the region. Three recommendations address this objective:

- Invest strategically in transportation
- Increase commitment to public transit
- Create a more efficient freight network

Overall, GO TO 2040 primarily recommends re-investing in and improving existing infrastructure, as well as creating new infrastructure that is well-connected, well-maintained and utilizes up-to-date flow management technologies. In prioritizing necessary investments to meet these objectives, two key principles are reflected in this combination of recommendations. In simplified terms, these are:

- "Fix it first" — Prioritize improvement of existing infrastructure components over building new ones (whether in densely developed areas or elsewhere); and
- "Do no harm" — Avoid new infrastructure investments that encourage a sprawling development pattern.

Specific transportation infrastructure investment recommendations include maintenance and upgrading of public transit; targeted transit service expansion; modernization of rail infrastructure to streamline freight movements; and maintenance and modernization of road infrastructure, to serve both freight and passenger traffic.

Further, new financing mechanisms and incentives — and adjustments to existing ones — are recommended to fund needed investments, while also encouraging increased use of public transit and car travel at non-peak times. These are:

- Increased and inflation-indexed state motor fuel tax (MFT) in the near term
- Congestion pricing on select highway segments[4]

Successful implementation of these transportation recommendations will allow businesses and residents to carry out their daily activities more quickly, easily and safely. The region will experience: reduced traffic congestion per capita,[5] lower travel times for commuting and other trips, reduced vehicle miles traveled, lower vehicle-based carbon emissions and improved system safety. The recommendations will reduce the need for travel via private auto, lower costs of transportation, increase residents' ability to access education and employment opportunities and improve businesses' ability to move goods smoothly into, out of and through the region.

Characteristic 2: Built Environment

One recommendation addresses accommodating future population growth through a pattern of more compact land use and strategic investment in supportive infrastructure such as water, sewer and stormwater management systems:

- Achieve greater livability through land use and housing[6]

The over-arching principle for addressing the region's built environment is that of "livability:" "a focus on reinvestment; denser, mixed-use development; walkability and support for transit; a range of housing options; environmental protection; design and aesthetics; and the context or 'fit' of development with the local community." The implementation actions therefore focus on investment and development efforts in existing communities, in order to capitalize on their existing infrastructure, building stock and social capital. They encourage new development and redevelopment that reflects a more compact pattern and facilitates use of public transit, as well as land-use regulations that allow for a mix of uses within close proximity to one another.

Implementation of this recommendation will: increase density in residential and commercial nodes; slow the consumption of open space by development; preserve open space and productive agricultural lands; decrease the need for travel via private auto to reach employment, education and key amenities; and increase the ease of face-to-face interaction among residents, businesses and other local institutions.

Characteristic 3: Labor Force and Firms

A third group of recommendations focuses primarily on supporting the growth of businesses in the region through continued development of a skilled workforce, creation of an innovation-enabling environment and a focus on developing jobs in emerging sectors. While many of the recommendations included in GO TO 2040 will affect the performance of the region's businesses, two in particular form the foundation for addressing this objective:

- Improve education and workforce development
- Support economic innovation

The first of these recommendations addresses improvements to both the P-12 and post-secondary education and training systems, as well as coordination across the entire P-20 system, to create a more skilled workforce. Basic education implementation actions address improving the quality of and equitable access to early childhood, primary and secondary education and shrinking the racial achievement gap in basic education. To address post-high school education and training needs, the implementation actions include refocusing workforce development activities to meet the future needs of employers (beginning with high-priority clusters such as freight/logistics and green energy/technology industries); increasing coordination among workforce development providers and strengthening the role of workforce intermediaries (including particularly community colleges); establishing a data-sharing platform to track progress, assess program effectiveness and plan for future needs; developing and articulating clear educational and career pathways; improving the accessibility and quality of education and training programs; supporting individuals at critical transition points within the workforce development system; and making program delivery mechanisms both stronger and more flexible.

Implementation of these education and workforce development recommendations will lead to a higher-skilled workforce that is better-qualified for and matched to the changing regional job market; increasing labor force participation; stronger labor pools for employers; and higher productivity (and correspondingly higher wages) for employees.

The second recommendation aims to influence levels of innovation across the entire economy, in four primary categories[7]:

- *Information*
  Measure, track and analyze input and outcome metrics, as well as innovation program results, to gain a better understanding of the regional environment for innovation, including where public-sector investment may be warranted;

- *Commercialization*
  Encourage public-private collaboration, technology transfer and commercialization of innovative ideas; provide training for innovators to become more effective entrepreneurs; and refocus the "success" measure of regional technology transfer programs on generating commercially viable products and services (versus focusing on patents, whether they are commercialized or not);

- *Funding*
  Identify new opportunities for funding and increase access to funding across all stages of innovation, with particular emphasis on creation of a new, regionally focused venture capital fund; and

- *Innovation culture*
  Generate more pervasive publicity around entrepreneurial "success stories;" facilitate greater collaboration between innovation programs, conferences and competitions; involve philanthropic organizations in creating linkages among diverse innovation stakeholders and showcasing the region's innovations; and identify opportunities for regulatory reform to encourage the commercialization of technology.

A final aspect of the innovation recommendation advocates focusing on the region's key industry clusters or areas of specialization. As a first step, analysis of the inner workings of the region's clusters and their workforces will likely focus on the high-potential areas of freight/logistics, green energy/technology and biomed/biotech, with work on other clusters to follow in subsequent phases. Implementation actions for the first phase of cluster-based innovation work include encouraging emergence of "innovation leaders" in regional clusters; facilitating the adoption of "green" business standards and processes across all clusters; and establishing a metropolitan-or Great Lakes-focused venture capital fund, with a potential emphasis on green technology.

Implementation of the innovation recommendation will lead to a larger number of collaborative research and development projects linking the public, private and institutional sectors; higher technology patenting rates; and higher rates of technology commercialization and entrepreneurship, particularly in key industry clusters.

While their inclusion in GO TO 2040 is not primarily to spur firm and job growth, two narrower recommendations[8] also fit in this category, when considered from the perspective of labor force and firm development:

- Create a more efficient freight network
- Manage and conserve water and energy resources

These recommendations advocate specific actions that will support two clusters — one existing and one emerging — influencing the region's industry and occupational mix.[9] The road and rail transportation improvements described earlier (Characteristic 1, Transportation Infrastructure), when combined with the intended cluster-specific innovation strategy mentioned above, will reduce costs and increase development of new products, processes and services for firms in the regional freight and logistics cluster. The second policy's recommendations include implementation of the Chicago Region Retrofit Ramp-up (CR3) Program to catalyze energy efficiency building retrofits; development of new green building design guidelines; and adoption of a revised energy code for new building design and construction. These recommendations will increase demand for energy-efficient buildings, driving market emergence, and will lower market transaction costs.

Over time, implementation of these cluster-focused recommendations — and ultimately, those for other clusters within the region — will broadly attract new firms to the region; increase the rate of new firm creation; fill gaps in existing supply chains; and enhance the performance of firms within clusters.

Characteristic 4: Governance

A fourth group of recommendations draws attention to the benefits that more effective government execution and cooperation can have on the future of metropolitan Chicago. Three recommendations address this objective:

- Pursue coordinated investments
- Reform state and local tax policy
- Improve access to information

The first of these recommendations advocates that federal and state programs more effectively work together across traditional agency "silos" (instead of being limited by them), and that corresponding funding be allocated at the regional (rather than state or municipal) scale where appropriate; that federal and state agencies modify program criteria, priorities and compliance requirements to streamline regional implementation; that CMAP take on a leadership role on policy and planning issues that cross jurisdictional boundaries; and that local government services be coordinated or consolidated where it makes sense to do so. The tax policy recommends that a Regional Tax Policy Task Force be formed to examine the impact of existing property, income and sales tax systems on regional land use patterns, as well as business attraction, retention and performance; streamline and improve the transparency of the tax system where possible; and broaden the tax base in an effort to keep rates low. The information policy recommends increasing the amount of high-quality data collected on regional performance through CMAP's Regional Indicators Project; positioning CMAP as a central information repository and facilitator of inter-governmental information flows; increasing free electronic access to and usability of government data sets by residents, businesses and other organizations (including making the Regional Indicators available through a regional web portal); facilitating a more streamlined flow of information from governments to the public; and providing technical assistance and acting as a resource to regional governments in their local data transparency and accessibility efforts.

Successful implementation of these recommendations will: increase funding for necessary public goods on an ongoing basis; mitigate tax system features that may unintentionally distort local land use decisions; reduce duplication in public services; increase electronic access to user-friendly public information by governmental units, business and private citizens; and increase the level of coordination among local units of government.

Characteristic 5: Quality of Life

A number of GO TO 2040 recommendations whose primary effects are not economic will change characteristics of the region in ways which may indirectly strengthen the economy. These effects address the regional quality of life, and fall into two categories: lowering household costs and enhancing regional amenities. The effects of both types of recommendations will make the region more affordable, environmentally sustainable and rich in the types of amenities that help attract and retain residents and businesses.

Household Cost Savings
Households will benefit from lower costs, primarily as a result of the GO TO 2040 recommendations related to improving transportation infrastructure and supporting energy and water conservation efforts, including residential retrofits. Lower roadway congestion and improved public transit will lower household transportation costs, while the lower energy and water consumption resulting from residential retrofitting and other conservation-based measures will lower household utility costs.

Amenities
A number of recommendations address qualities of the region that make it a desirable place in which to live, work and do business. These include those related to transit investment and transit-supportive land use; design of livable, walkable mixed-use communities; conservation of water and energy resources (through building retrofitting, water resource management, green infrastructure and other strategies); promotion of sustainable local food (both production and distribution); and expansion and improvement of parks and open space, prioritizing efforts in areas that contain sensitive natural resources, lack adequate open space access or where connections can be strengthened between existing parks or preserves. All of these recommendations — and, broadly, the plan's focus on creating livable, less costly, communities — will have a positive impact on the lifestyle and amenity options available in the region, helping attract workers and firms.

CHAPTER II: Regional Economies

How will the GO TO 2040-driven changes in the characteristics of the region, described in Chapter I, affect its economic performance? This chapter begins by laying out the rationale for focusing on regions as the critical unit of geography in today's economy. A simple framework is then provided to describe the way a regional economy operates, in terms of its basic components and mechanisms, in the context of global trends in the economy. This framework allows identification of five leverage points that are currently key drivers of regional economic growth, and that are affected by the changes in the economic landscape anticipated to flow from GO TO 2040. With this context, subsequent chapters then examine in detail, for each leverage point, how it operates to increase economic growth and how the GO TO 2040-driven changes will affect the leverage point to enhance economic performance.

A. The Importance of Regional Economies

Population has become increasingly concentrated in the past 50 years, both within the U.S. and globally. As of 2009, the proportion of the world population living in urban areas had passed the 50% mark, and is expected to reach 69%, or 6.3 billion people, by 2050.[10] Population concentration has made the U.S., in particular, a "metro nation," with 84% of the population living in metropolitan areas.[11] Infrastructure and institutions are also highly concentrated, with the largest 100 U.S. metropolitan areas boasting 66% of the nation's research universities, 92% of air passenger traffic and 95% of public transit passenger miles.[12] This trend toward concentration in metropolitan areas is expected to continue, as growth in these areas is outpacing non-metro areas.[13]

The extent to which people and other economic assets are concentrated in metropolitan regions is striking, but more significant is the disproportionate degree to which metropolitan areas contribute to the national economy. While the 100 largest U.S. metropolitan areas are home to about two thirds of the nation's population,[14] they generate 73% of the nation's economic output (gross product).[15] Further, they produce a disproportionate share of jobs, knowledge workers, patents, research and venture capital investments.[16] Metropolitan areas not only aggregate the assets that matter most, but also amplify them through geographic agglomeration and multiplier effects that connect and boost inputs and outputs to generate regional — and thus national — prosperity.[17] In short, metropolitan areas are where the nation's assets agglomerate to create most of the nation's economic value.

This is no coincidence. As research in the burgeoning field of economic geography is demonstrating almost daily, the geographic proximity of key assets and actors in the economy enhances their individual and collective performance.[18] Indeed, this appears to be truer than ever in the knowledge economy. From an economist's point of view, the reason for the very existence of cities — and their attendant economic regions — is to reduce the transportation costs of goods, people and ideas.[19] Dense networks of suppliers, service providers and customers within close proximity of firms reduce transportation and transaction costs. The benefits of concentration provide additional "agglomeration economies" through shared inputs to production, deep labor pools and knowledge spillovers.[20] Large, diverse labor pools enable firms to more efficiently find and hire the particular types of workers that they need to be most productive. The opportunity for face-to-face interaction across firms and between individuals, as well as the movement of employees between firms, facilitates the sharing of ideas that generates increasing returns to knowledge and spurs innovative activity.[21]

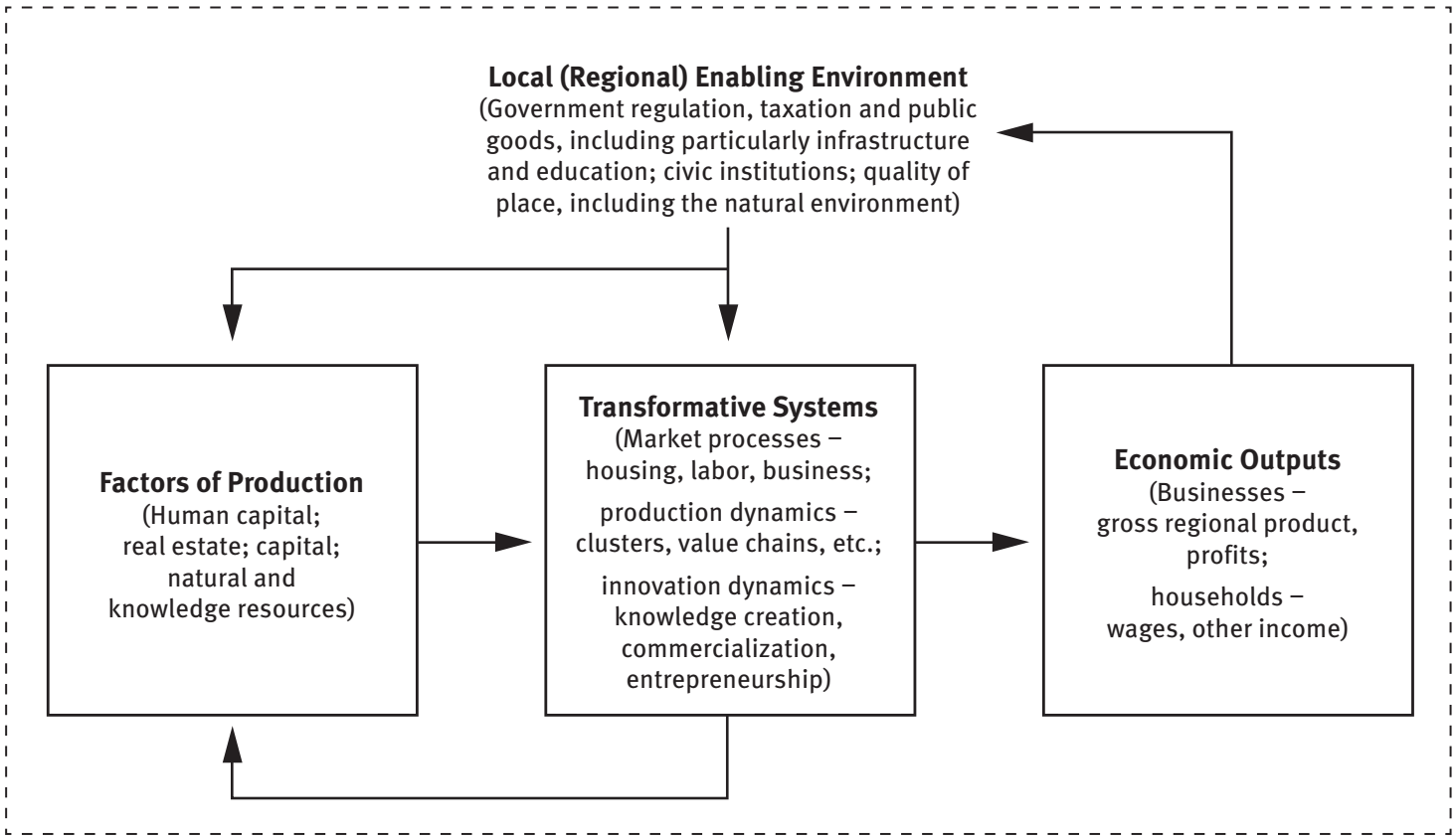
As a result, increasingly, it is regions[22] — and not nations — that are primarily competing in the global economy.[23] It thus makes sense for GO TO 2040 to be focused on the region as the key geographic unit for facilitating economic growth. A slightly more detailed examination of how the components and mechanisms of a regional economy interact to achieve these benefits will enable exploration of how the specific recommendations of the plan will influence these interactions, and ultimately regional economic performance.

B. What Drives Regional Economic Growth

Regional economies are complex, dynamic systems arising from the interactions of housing, labor, business and other market systems with characteristics of place, all enabled and shaped by government and civic sector activity, as well as by an equally complex global environment and marketplace. System performance is a function of the interactions of millions of people and firms in this market and institutional context, with the actions of each affecting the behavior of the others in an ongoing, iterative cycle. To improve the deployment of assets — to create jobs, income and wealth — requires understanding how these systems work, in order to understand how to influence their performance. For particular interventions, this may entail working at sub-regional geographies specific to the system of interest, but in any event it entails thinking and acting within a regional framework. Whether the goal is development of the neighborhood, the city or the suburb; human capital or business growth; one has to understand how the assets and markets intersect and relate across — and combine to constitute — the regional economy.

Analyzing how any given change will impact its performance entails first understanding the context and key components of the economy, and the systems through which they interact to deploy assets efficiently and productively (or not).

The **outputs** of the regional economy — the total value of goods and services produced (gross regional product) — result from the complex interactions of millions of individuals and businesses. These interactions take place through a set of overlapping and interrelated systems — primarily **market systems** — that combine and transform inputs (**factors of production**) into tangible economic results. The quality of these interactions — specifically the efficiency and productivity of these systems — depends in part on **the enabling environment** (such as infrastructure), which in turn is determined by local governmental and civic institutions, as well as natural qualities of place. From a micro-economic point of view, increasing outputs inherently flows from business sector growth — increasing the number, size and productivity of firms in the region. Business sector growth, in turn, occurs through firm creation and growth, retention and attraction. Firms grow and choose to locate where they can be most efficient and productive (a function of both firm and system, particularly market system, operations). We are thus ultimately concerned with what attributes of the region — its factors of production, transformative systems and local enabling environment — lead to increasing creation, efficiency and productivity of firms.



Examining these dynamic interactions and operations of the components of a regional economy enables identification of the main drivers of regional economic growth which can be influenced by interventions. As discussed extensively in the chapters which follow:

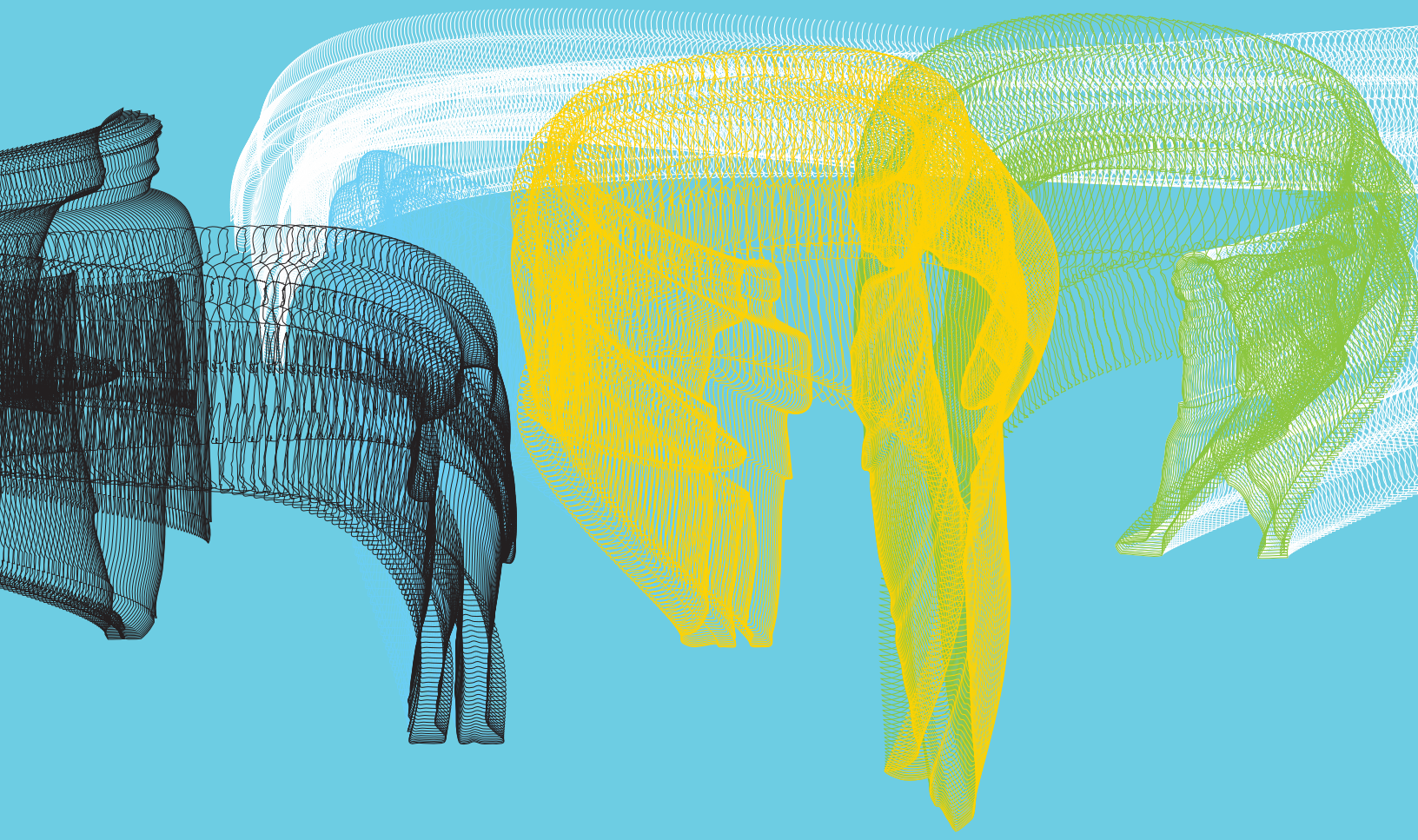
- The balance of taxation and public goods; the quality of particular public goods, especially infrastructure and education; and the public, private and civic culture are all critical factors in the ***enabling environment*** for economic activity;
- Knowledge embedded in the labor force (human capital) and in information resources and technologies is an increasingly important ***factor of production***; and
- The dynamics of "clusters" of firms and related institutions; the innovation "ecosystem"; and, as always, the efficiency of market operations are the critical processes (***transformative systems***) determining the efficiency and productivity of economic production.

Focusing on these key aspects of how a regional economy functions enables identification of five key leverage points through which CMAP's GO TO 2040 recommendations will impact the metropolitan Chicago economy:[24]

- *Fostering an innovation- and entrepreneurship-enabling environment*
  The ability to innovate has been a longstanding driver of productivity gains, and is a growing priority in policy and practice targeting economic growth.[25]
- *Enhancing performance of existing and emerging clusters*
  Concentrated economic activity benefits the production of goods and services by reducing transportation costs, enabling shared labor and other inputs, facilitating spillovers and exchange and enhancing innovation.[26]
- *Improving the region's spatial efficiency*
  The location of businesses, suppliers, workers and consumers within a region — and the infrastructure connecting them — determines the transportation costs between them, and also influences the economic benefits of agglomeration, such as shared labor pools and knowledge spillovers.[27]
- *Developing and deploying human capital*
  Human capital is the single most important input to economic growth, but leveraging it to improve regional economic performance requires not just producing high levels of education and skills, but also retaining and deploying talent through creation of and alignment with employment opportunities.[28]
- *Improving governance to support private-sector economic activity*
  Government can enable and enhance private-sector performance by shaping the fundamental dimensions of economic interactions and production, including establishing market conditions, developing human capital and infrastructure and so forth.[29]

Finally, the regional economy operates in the context of a changing global and **macroeconomic environment**, which similarly informs these leverage points. This context also influences how the leverage points operate to affect productivity and growth, and whether they are directed toward viable long-term growth trajectories. The rise of the knowledge economy,[30] in particular, infuses much of the discussion that follows. The increasing role of knowledge embedded in people and technologies in driving economic growth has had — and can be expected to continue to have — enormous implications for the relative importance of inputs (e.g., high human capital); drivers and how they operate (e.g., knowledge spillovers, functional concentrations, institutional and innovation economics); and even the spatial arrangement of assets (e.g., benefits of density facilitating face-to-face interaction and idea exchange).[31]

The chapters that comprise the balance of this document articulate, for each leverage point, (a) what it means and why it is significant for economic growth; and (b) how the GO TO 2040 recommendations will influence it, and so translate into impact on performance of the regional economy.



CHAPTER III: Fostering an Innovation- and Entrepreneurship-Enabling Environment

A. Definition and Significance

Innovation is the development of new ideas, products, services, technologies, processes, systems, organizational structures and business models that increase the efficiency or productivity of business operations or spur the emergence of new markets.[32] This definition, while useful in its breadth, potentially encompasses nearly every potential change to economic production. For practical purposes, it proves important to tease out some of the dimensions of and distinctions within innovation, particularly related to stages and levels:

- **Stages**
  As used here, innovation is defined as spanning the entire spectrum from basic research and idea generation, through concept testing, product development, commercialization (introduction into the marketplace) and business creation, growth and expansion. Despite the conceptual clarity of such a linear model from idea generation to business and market growth, recent work in the field views the innovation process as more iterative and open: "particular innovative activities can both be cause and result, consequence and prerequisite."[33] That is, an innovation process need not include all of the stages articulated in the chain or complete them in a strictly sequential order.[34]

  Defining and examining innovation this broadly — to go well beyond invention to firm and market creation and growth — makes particular sense from an economic development point of view: the definition used here explicitly includes the stages which translate the inventive process to a measurable impact on the economy. In order to impact the regional economy, a new idea must ultimately be deployed — it must "push existing companies to real cost reductions and new firms toward growth."[35] For this reason, entrepreneurship is included here in the spectrum of innovation activities, as it is often a key step in translating new products into economic activity.[36]

- **Levels**
  Like many other subjects in economic development, innovation can be approached at both the firm (micro) level and the market or system (macro) level. A vast business literature targeted at firms highlights very specific firm innovation practices and disciplines, as well as broader issues such as firm "culture."[37] While innovation overwhelmingly occurs within individual firms, in the aggregate firms constitute and are part of larger market systems and institutional (including government) environments which determine firm inputs (e.g., human capital), market demand and adoption, and an overall "innovation ecosystem,"[38] all of which in turn influence firm innovation. Given our focus on regional economic development practice, we will be primarily focused on system level interventions here.

From an economic standpoint, innovation is the source of all long-term economic growth, since it is the only path to increasing the quantity and quality of the goods produced from the finite resources of the overall economy.[39] Innovation has received much more attention, particularly as a direct focus for economic growth interventions, with the emergence of the knowledge economy, including through "new growth theory" and "innovation economics."[40] Generally, in the knowledge economy, knowledge embedded in labor force (human capital) and technology is increasingly important to economic success (including particularly to innovation), and concentrations of knowledge factors (high human capital, information sectors and technologies, innovation infrastructure, etc.) build upon themselves — with increasing rather than diminishing returns — so that, in effect, the places that get ahead tend to keep getting further ahead.[41]

This dynamic, in combination with an increasingly open global marketplace, has led researchers and practitioners to place a higher priority on finding ways to more directly and deliberately foster innovation, and thereby catalyze economic growth. The growing intensity of global competition makes it more imperative for nations and regions to gain and maintain a competitive edge in creating the next generation of products, services, processes and business models.[42] The pressure of international competition is evidenced in other nations' challenges to long-standing U.S. leadership on key indicators like worldwide shares of domestic R&D spending, new patents and science and engineering degree holders and publications.[43] Indeed, arguably, in the "next economy,"[44] the speed of economic change has accelerated — with shortened product development cycles; increased business "churn" (Schumpeter's "creative destruction"[45]); nearly instantaneous global exchange of information; lower costs and faster transportation of goods; the advent of internet based "open" innovation-development processes; and the emergence of large-scale markets in developing nations.[46] In this context, finding ways to effectively foster an "innovation ecosystem"[47] — all of the components that collectively lead to more development of cutting-edge ideas and commercialization of new technologies, enhancing both productive and adaptive efficiency[48] — has become a higher priority for driving economic growth.

As a result of this focus, more sophisticated understandings are emerging of the stages, mechanisms and drivers of innovation as it translates to economic growth — from idea to product to commercialization, business formation (or deployment in existing business) and market growth — and of the factors influencing actors' ability to progress successfully through the stages and achieve economic impact.[49] Broadly, in formulating a strategic approach to designing innovation-enhancing initiatives targeted to the circumstances of their local economy, practitioners need to address three broad (and overlapping) areas:

- **Foundational — Inputs and Ecosystem**
  These are the basic inputs and infrastructure that set the stage for building regional innovation capacity and are virtually identical to the leverage points discussed in depth in other chapters of this paper.[50]

- **Stage-Specific**
  Interventions can be tailored and targeted to those stages of the innovation process where barriers or opportunities are particularly present.[51]

- **Industry- and Cluster Specific**
  Many of what could otherwise be considered "foundational" or stage-specific interventions are often better organized around, tailored to and delivered in the context of particular cluster strategies.

Policy makers and practitioners can identify which specific factors and interventions exhibit the greatest potential for accelerating innovation with respect to each of these areas.[52]

To that end, the emerging body of research and practice can be organized into five key strategies that enhance regional innovation and entrepreneurship activities (and which are addressed to varying degrees in CMAP's GO TO 2040 recommendations):

- Develop high-quality human capital
- Facilitate networks that enable interaction and spillover of ideas among knowledge workers (including strengthening of both industrial and functional clusters)
- Foster a supportive institutional environment and culture
- Ensure access to investment capital for R&D and new ventures
- Support entrepreneurship and small firm growth

Human Capital

The general and critical importance of human capital to economic growth is discussed in Chapter VI. One of the key ways in which the level of human capital embodied in a region's labor force influences economic growth is through its impact on innovation. In general, higher levels of education[53] — particularly in science, technology, engineering and mathematics (STEM) fields[54] tend to be associated with higher levels of innovation. While data limitations often dictate that researchers use formal educational attainment as a proxy for human capital, it is higher levels of human capital more broadly that lead to innovation, and human capital encompasses all of the skills embedded in the labor force, including particularly the many and often more important skills learned through experience and on the job. Practical, experiential and technical skills are particularly important to certain types of innovation, such as developing a user-friendly new product feature or instituting a time-saving adjustment to a manufacturing process. In addition, the human capital profile of successful entrepreneurs is often quite distinct from the human capital required in the earlier idea generation and product development stages of the innovation process. Successful entrepreneurs, for example, tend to be less risk-averse and more resilient.[55] Finally, as discussed immediately below, the knowledge spillovers and synergies enabled by concentrations of these varied kinds of human capital are also key contributors to a region's innovative capacity.

Knowledge Networks and Spillovers

The exchange of ideas, and particularly their combination in varied and novel ways, is a key factor for driving all stages of the innovation process, enhancing the innovative capacity of human capital beyond what would be achievable in isolation.[56] These "knowledge spillovers" can occur as the result of informal social ties, worker mobility among firms and institutions (as their knowledge is combined and recombined with that of others)[57] or through more formal networks and events that bring researchers, entrepreneurs and other relevant actors together. Depending on the industry, patenting and innovation may be increased by spillovers either between actors in the same industry, or across industry boundaries.[58] One way to increase spillovers of either type is to provide formal networking opportunities such as industry-or occupation-specific professional organizations or forums in which diverse groups of individuals and firms can interact and cross-fertilize around problems or topics of mutual interest.[59]

Institutional Environment and Culture

The institutional environment, including — but far from limited to — government, can provide incentives (or disincentives) for certain types of activities that contribute to the region's degree of innovative and entrepreneurial activity.[60] Institutional frameworks shape the ways in which economic actors behave and the way an economy evolves over time, by laying out the processes, routines, rules and regulations that govern the engagement of actors in various types of transactions. For example, university policies around royalties, equity investments and related aspects of technology transfer may negatively affect researchers' propensity to commercialize university-developed technologies via new firm creation.[61] Conversely, the presence of intermediary organizations and information networks that facilitate access, communication and support across public-

private, industry and other boundaries can foster a more dynamic environment for innovation and entrepreneurship.[62]

The formal framework of institutional policies, regulations and administrative procedures clearly shapes the regional innovation environment. However, less tangible aspects of the region's business culture also have a meaningful impact on the level of local innovation and entrepreneurship, influencing the way that private firms and individuals interact with public, civic and other institutional actors[63] through the set of norms, values, tacit conventions and "rules of the game" in a place.[64] Regions that exhibit certain cultural values are more likely to facilitate growth through innovation. These values include an openness to new people and ideas; appreciation of risk taking and tolerance of failure; promotion of cooperation and coordination; emphasis on learning; pursuit of public-private consensus; company commitments to social well being; perception of science as socially valuable; strong interface mechanisms in the scientific, technology, production and financial fields; university and workforce training systems linked to the private sector; and flexibility and adaptability of organizations, labor force and consumers.[65]

A region's institutional environment and culture are not only important in their ability to be flexible at a given point *in* time, but also in their ability to change *over* time — their "adaptive efficiency."[66] The ability of economies and institutions to continually adjust course and reinvent themselves over time, in response to changing circumstances, depends upon "the willingness of a society to acquire knowledge and learning, to induce innovation, to undertake risk and creative activity of all sorts, as well as to resolve problems and bottlenecks of the society through time."[67] A cultural and institutional environment that embraces and adapts to change, even change as drastic as contemplated by Schumpeter's concept of "creative destruction,"[68] plays a critical role in driving economic progress through innovation.

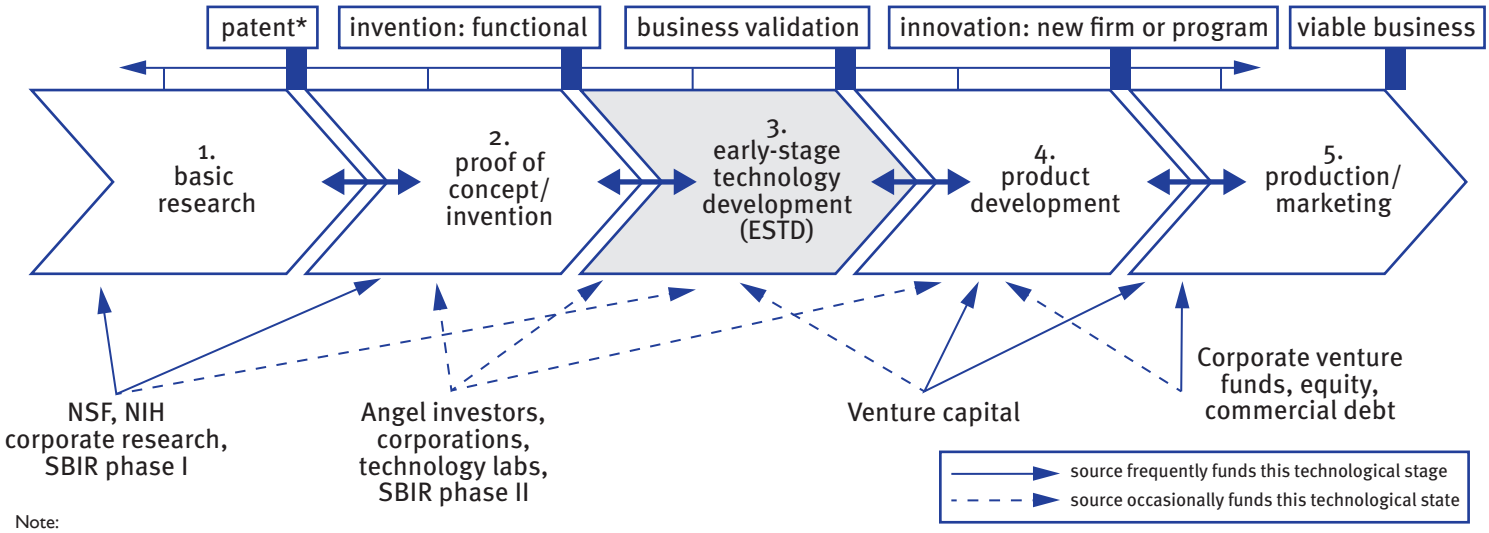
Funding

Though the causal mechanism may be complex, a large amount of empirical research highlights the positive relationship between access to stage-appropriate funding (see illustrative chart, below) and successful innovation. Availability of R&D funding ensures sufficient resources are dedicated to early stages of the innovation process in which solutions are formulated and technologies are developed, but which are higher risk, have longer time horizons to generate economic returns, and for which the innovator may not capture all of the economic value created.[69] These barriers and externalities particularly justify public subsidies for early stage R&D.[70] Government-funded basic research has substantially driven many major technological innovations,[71] including development of the internet.

Securing sufficient financial support can also be a significant obstacle for new businesses with high growth potential,[72] posing an additional challenge to their survival during the critical early stages of development. Though only a small share of start-ups receive venture capital (VC) investments, VC in particular is often cited as a key ingredient to the success of innovative new businesses.[73] VC investments provide a necessary bridge that sustains growing businesses between early-stage "friends and family" or "angel" funding and eligibility for traditional bank financing, providing the entrepreneurs the opportunity to cross what has been referred to as the "valley of death" for innovative ventures.[74]

The stages of innovation and their respective funding sources are illustrated in the chart below.[75]

Figure 2. Sequential model of development and funding



Note:
The arrows across the top of, and in between, the five stages represented in this sequential model are intended to suggest the many complex ways in which the stages interrelate. Multiple exit options are available to technology enterpreneurs at different stages in this branching sequence of events.

The region corresponding to early-stage technology development is shaded in grey.

The boxes at top indicate milestones in the development of a science-based innovation.

*A more complete model would address the fact that patents occur throughout the process.

Entrepreneurship and Small Firm Growth
A dynamic entrepreneurship and small-business community enhances innovation through both taking inventions to market, and because much innovative activity originates in these firms.[76] A high rate of new firm creation is linked with increased levels of innovative activity,[77] and a high rate of "business churn"[78] suggests that a region is replacing outdated firms with innovative and efficient companies. Creation of high-growth "gazelles," in particular, is a fundamental (some argue primary) source of job and wealth creation[79] in today's environment of "entrepreneurial capitalism."[80]

Driving Entrepreneurship/New Firm Starts
Many of the mechanisms that affect levels of entrepreneurship overlap with those already discussed in relation to innovation, including the presence of skilled, entrepreneurial human capital (both in entrepreneurs themselves, as well as their employees), a regulatory and legal environment in which there are few obstacles to new firm creation and start-up,[81] and the availability of stage-appropriate financing. It is also important that the innovation pipeline — ideas, applied R&D, testing, product development — be strong, so that entrepreneurs have a rich pool from which to select the most promising opportunities for commercialization.[82] Universities play a large role in developing technologies with commercial potential, and the more streamlined and timely is the process of technology transfer — moving ideas "out the door" — the more active and successful the entrepreneurial segment of the economy can be.[83]

Supporting Small Firm Growth
Relationships with complementary firms facilitate and accelerate growth of entrepreneurial ventures. Firms that provide knowledge-intensive business services (KIBS)[84] can also act as "bridges" or interfaces aiding small- and medium-sized firms' innovation activities. The explicit and tacit knowledge that small firms receive from KIBS providers, when combined with the firms' own industry-and firm-specific knowledge, enable an increased pace of firm growth and development.[85] Additionally, establishing strategic alliances with firms that exhibit complementary knowledge bases can increase small firms' level of innovative activity and enable them to grow more rapidly than they would if working in isolation.[86]

Myriad programs have been designed to provide technical and supportive services to small firms, with mixed success. It appears that entrepreneurs tend to benefit more from peer exchange and from mentors with deep business experience; and that technical assistance services are more effective when highly tailored to the type of business and stage of development, and packaged with practical hands-on engagement, finance or other types of tangible support.[87] Networks of private-sector partners (particularly peer networks between early-stage firms), technical assistance programs, professional service providers and investors can be important mechanisms for strengthening small and emerging firms.

B. Impacts of GO TO 2040 Recommendations

It is now possible to begin directly addressing the question of how implementation of the recommendations in GO TO 2040 will impact the regional economy. Currently, the region's performance on innovation and entrepreneurship does not meet its potential. The patenting rate is about average for the nation: 5.3 patents per 10,000 employees, ranking 41st among the largest 100 U.S. metros and on par with the U.S. average of 5.4. Translating new ideas into market-ready products, however, may be constrained by too modest levels of technology transfer and licensing at many local universities, compared to other large research institutions.[88] In terms of new firm creation, the region is performing at below-average levels. While there are about 18% more firm births than deaths annually, the region ranks 55th among large metros on "business churn," a measure of the dynamism and fluidity of the economy (firm births and deaths as a share of total establishments). Performance is particularly weak on the creation of mid-size establishments (those between 20 and 499 employees) at a rate of 4.3 firms per 10,000 employees, ranking the region 92nd among the largest 100 metros.[89]

How will the effects of GO TO 2040 on the regional economic landscape (as described in Chapter I) influence the factors which lead to innovation? Innovation occurs largely through private sector activity. As indicated by the innovation research cited above, the recommendations in GO TO 2040 will enhance the inputs to, environment for and processes of innovation and, as a result, enable greater firm growth and (consequently) greater economic growth across the region. At the same time, these recommendations are not deeply tailored to analysis of the particular types and stages of innovation which present current opportunities in the local economy — a key next step as implementation proceeds.

Human Capital
GO TO 2040 includes extensive recommendations focused on increasing human capital levels, essentially from cradle to grave (see Chapter I, Characteristic 3). As described above, higher levels of human capital lead to higher rates of innovation, and consequently increased productivity and economic growth. The plan's recommendations, or next steps toward implementation, might benefit from exploring in more targeted ways where the region stands with respect to specific types of human capital that contribute to innovation in the key clusters possessing high potential for economic growth (see Chapter IV). Determining whether shortages exist in key skill sets — e.g., STEM degree holders, healthcare professionals, business and financial services specialists — will enable better tailoring of human capital development strategies to seize growth opportunities.

Knowledge Networks and Spillovers

GO TO 2040's recommendations will increase the extent of information sharing and cross-fertilization of ideas among organizations and individuals, creating the knowledge networks and spillovers that lead to higher rates of innovation (Chapter I, Characteristic 3). In particular, the recommendations of fostering greater collaboration and enhanced exchange of ideas among firms, potential entrepreneurs, universities and other research organizations will provide significant new opportunities to share information related to commercial applications of research and avenues for taking them to market. Reviving the State of Illinois' ITEC program could have a particularly meaningful impact on strengthening connections between the public, private and institutional realms to support the start-up business needs of emerging entrepreneurs.

It should be noted that the emphasis of GO TO 2040's recommendation around knowledge networks and spillovers is primarily focused on the later stages of the innovation process — fostering relationships that contribute to increased commercialization and entrepreneurship — rather than on the earlier stages. Commercialization is generally a critical phase, and the quick "snapshot" indicators at the opening of this section on the current state of innovation in the region suggest it is a key area, but further analysis is necessary before limiting to this phase. As it moves toward implementation, CMAP may want to consider augmenting its innovation recommendations to address strengthening of networks and idea exchange in the idea generation and concept testing stages,[90] including particularly between research institutions and the private sector.

The increased idea generation facilitated by knowledge networks can have a particularly significant impact on economic growth. For example, at least 50% of growth in U.S. gross national product between 1950 and 1993 has been attributed to increases in the "stock of ideas" produced by researchers.[91] GO TO 2040's recommendation to strengthen knowledge networks and facilitate knowledge spillovers should therefore lead to greater profits and output when new ideas are commercialized, thus translating to regional economic growth.

Institutional Environment and Culture

GO TO 2040's recommendations will also enhance the region's institutional environment and culture for innovation (Chapter I, Characteristic 3, as well as aspects of Characteristic 4, such as government coordination and better information). In combination, refocusing technology transfer programs on commercialization, creating more linkages between innovation competitions, conferences and organizations, publicizing local "success stories" and making better information available,[92] among other suggestions, will help enhance the region's attractiveness to innovators and entrepreneurs, and support their and the region's success.

Moving forward, these actions could be more strategically focused in three ways. First, the recommendations related to improving commercialization of technology might be more effective if they were delivered through a cluster-based framework (see Chapter IV). That is, because cluster-specific technical knowledge is often necessary in bringing new ideas to market, commercialization assistance may be more effectively delivered in ways that are tailored to the needs of particular clusters. Therefore, delivery through programs such as ITEC and IEN, while potentially beneficial to a subset of firms, may not provide assistance that is sufficiently specific to support some innovators. Several cluster-specific innovation organizations already exist in the Chicago region (e.g., iBio); leveraging these organizations' knowledge and experience to implement GO TO 2040's commercialization recommendations may offer a greater chance of success.

Second, the innovation culture recommendations could be improved by increasing their specificity, which would require a deeper understanding of the cultural environment than is currently included in GO TO 2040. In particular, efforts should be made to interact directly with the business community to gain insight into both the innovation opportunities in the marketplace, and the types of challenges they face in pursuing innovative activities within the region. Challenges may be very general (e.g., risk aversion, impatient capital) or related to particular stages of the innovation process. For instance, if stakeholders are encountering obstacles related to university technology transfer practices, access to facilities or expertise for proof-of-concept testing or funding and technical support for start-up firms, appropriate interventions could be formulated to address the most critical stage-specific issues.

Finally, the GO TO 2040 recommendations could be enhanced by explicitly addressing the innovation needs of large firms, in addition to those of start-ups and small businesses. While these firms do not need assistance with "commercialization," per se, they may also benefit from outside institutional relationships to support earlier stage R&D, product development and concept testing.

Funding

GO TO 2040 also addresses the funding inputs to innovation, including specific matching grant, ITEC and venture capital recommendations (Chapter I, Characteristic 3). Better identifying and accessing existing funding and making more stage-appropriate funding (and technical assistance) available to researchers and aspiring entrepreneurs will increase the likelihood that more products will reach the market and more new businesses will survive the earliest, most risky stages of development.

While GO TO 2040's recommendations around venture capital funding will facilitate the commercialization of new technologies and creation of new businesses in the region, the plan does not make any specific recommendations regarding early-stage innovation funding. Stage-appropriate funding for pre-commercial research and development (e.g., basic and applied science) is necessary to generate a sufficient pipeline of ideas for commercialization. CMAP may want to consider further exploring the needs of earlier-stage researchers and innovators in the region, to determine whether additional funding programs or financing tools are warranted to support and enhance their work.

Implementation of the GO TO 2040 recommendations can be expected to improve the local innovation environment in several ways. National studies suggest that venture capital firms tend to invest twice as much locally, that industry-focused VC funds (such as the potential clean technology focus of the recommended local VC fund) are effective,[93] and that VC-backed firms tend to outperform non-VC-backed firms in terms of both job growth (1.6% versus 0.2%) and revenue growth (5.3% versus 3.5%).[94] Empirical evidence further suggests that a doubling in the number of firms funded by local VC firms implies a 1.2% increase in the overall number of new establishments (of 0-19 employees), while doubling the supply of venture capital in the average region can result in a 1.4-6.4% increase in aggregate income.[95] Increased presence of venture capital funds in the region can be expected to spur regional job creation as well as revenue and wage growth.

Overall, then, by enhancing human capital, knowledge networks and spillovers, the institutional and cultural environment and availability of appropriate funding, GO TO 2040 can be expected to substantially increase technology commercialization and entrepreneurship activity in the regional economy. Additional attention to policies and programs that address early-stage innovation can further enhance the region's innovation capacity. Deeper analysis of the types and stages of innovation that present the most opportunities in the context of the current regional economy should inform more tailored next steps. Increased innovation, in turn, will lead to growth and productivity gains for existing firms and the creation of new firms — the essence of regional economic growth.

CHAPTER IV:
Enhancing Performance of Existing and Emerging Clusters

A. Definition and Significance

A cluster is a group of firms and related economic actors and institutions that are located near each other[96] and "draw productive advantage from their mutual proximity and connections."[97] A cluster can consist of hundreds, and even thousands, of firms of various types and sizes — from Fortune 500 corporations and large professional service firms (advertising and accounting businesses, for instance) to highly specialized R&D operations and small supplier businesses — along with related entities such as business associations, research universities, community colleges, worker training providers and professional development entities that support and connect firms to each other. To constitute a cluster, these firms and institutions must be interdependent actors linked economically, socially and technologically within a region — a sort of production "ecosystem."[98]

Clusters reflect a form of agglomeration (see Chapter II, Section A): the member firms gain efficiency and productivity benefits from co-locating. Clustering is generally used to refer to concentrations of related economic activity that achieve more than the common economic benefits flowing to diverse, disconnected firms which share infrastructure and resources in a common geography (known as "urbanization economies"[99]). Instead, a cluster generally describes related firms and economic activities[100] — those that interact through supply chains and competitive or other relationships — whose geographic concentration and relationships reduce transportation and infrastructure costs, enable the sharing of labor and other inputs, may ease access to consumer markets, facilitate "knowledge spillovers" and the exchange of ideas among firms and enhance innovation (characteristics of "localization economies"[101]) — all leading to increased productivity of the firms in the cluster.[102]

The concept of localization economies has been common parlance in economic literature for quite some time, and conventional industry clusters have been recognized going back to the beginning of the industrial age. Michael Porter's work brought the concept of economic "clusters" into the mainstream about 20 years ago. In 1990 he identified essential characteristics of what he defined as "geographic concentrations of interconnected companies and institutions in a particular field."[103] These included: linked industries, suppliers and specialized business infrastructure; distribution channels and customers; companies with related skills and technologies; and related research organizations, universities, standard-setting organizations and training entities. Alternatively, Rosenfeld defines clusters as a "critical mass" of firms and related entities "that is sufficient to attract specialized services, resources and suppliers."[104] In the past 20 years, much additional work has further identified the mechanisms and competitive benefits of clustering.[105]

Cluster analysts are looking particularly closely at the effect that advances in communications technologies are having on the importance of physical proximity for regional clusters. While many social observers predicted that the advent of the internet age would eliminate the importance of physical proximity, the evidence is quite the opposite. The extensive face-to-face "gluing" that firms benefit from in regional clusters remains essential, because the benefits of clustering involve transmission of tacit knowledge and ideas that cannot be gleaned from codified literature or communicated over long distances. The in-person interaction within clusters more easily facilitates this type of informal learning among members, as well as the knowledge spillovers that occur through the firm-to-firm movement of employees within a common labor pool.[106] More broadly, as the cost of transporting goods has gone down, but the value of face-to-face interaction has gone up (including because of the shift toward a service economy), activities in the knowledge economy appear to favor the density of cities.[107]

Recent evidence suggests that the emergence of a global and knowledge-based economy is also affecting what economic activities most benefit from clustering. As transportation costs for goods have declined and the importance of interactions between the human capital embedded in firms and institutions has increased, regions are experiencing the emergence of new "functional" clusters that specialize in different parts of production processes.[108] Functional concentrations, such as corporate headquarters, back-office or R&D capacities are thus becoming more important, as are occupational concentrations. In effect, agglomeration economies arise from the proximity of facilities that perform the same functions for different firms, rather than from the proximity of firms that operate in the same industry.[109] As a result, firms previously organized as a single unit or vertically clustered within an industry may now tend to become multi-unit organizations or benefit more from the co-location of horizontal functions. Units performing different functions then tend to locate in places where those functions are best supported (in terms of cost efficiencies and productivity factors). Specifically, Duranton and Puga maintain that firms tend to locate their headquarters in places that offer a wide array of business services, while production plants are moved to more sector-specialized cities.[110] An example of this trend is provided by the decision of the Boeing Company to move its corporate headquarters to Chicago, while its primary production facilities remain in Seattle.

Clusters drive regional economic growth through increasing firm productivity, leading to the growth of existing firms in the cluster, attraction of related firms to the region (since they will be more productive if attached to a relevant cluster) and creation of new firms. Moreover, because cluster-based firms have productive advantages over competitors, these firms tend to achieve higher profitability and pay higher wages than non-cluster firms.[111]

There are several caveats to this positive scenario for cluster effects in a region. One is that some clusters form in low-growth or low-wage industries and simply cannot generate sufficient economic benefits from clustering to overcome general industry disadvantages. A second is that if just one or a few highly specialized industrial clusters dominate a region's economy, it creates more risk if they decline (e.g., Detroit and automakers). Of course, a region can have multiple clusters, and so combine the benefits of diversity and specialization.[112] Further, the cluster notion itself — already a complex concept encompassing an array of different types of concentrations, which are shifting as the economy changes — has become highly

popularized and diluted, such that it is often misapplied in identifying and characterizing clusters. Analysis of clusters is a complex art requiring detailed engagement of the potential members of the cluster and "mapping" of the relationships and interdependencies to get any practical, actionable degree of reliability for particular local clusters.[113]

What's new about clusters is not their existence, but the realization among economists, economic development practitioners and public policymakers that the framework provides a useful heuristic for understanding the local operations of the production side of the economy, and for pursuing regional economic growth by intentionally cultivating the emergence, growth and maintenance of specialized concentrations of economic activity. Through both theoretical and empirical research, a number of factors have been identified that contribute to cluster formation and success. These include, among others, Michael Porter's four basic conditions for cluster formation[114] and Cortright's "micro-foundations" for clusters, based on a review of cluster-focused literature.[115]

Identification of these factors, however, does not address the questions of what aspects of which clusters can be influenced, and how: how cluster-building processes that occur naturally as a result of individual firms operating in their own interests can be encouraged, affected or made more effective through conscious and explicit effort. The answer to this question continues to be intensely debated by academics, practitioners and public officials but there is agreement that what can be done is, to some extent, limited,[116] and that clusters are highly differentiated moving targets: appropriate actions will vary by cluster and throughout a given cluster's lifecycle.[117] Nonetheless, there is a growing field of real-world practice from which to learn, and a number of specific "best practice" recommendations for influencing key factors in cluster success.

Perhaps the most valuable lesson for practitioners and policymakers is that development of clusters is quite different from traditional government economic development. The latter tends to focus on financial subsidies for and recruitment of specific firms or on broadly creating a favorable "business climate" (in this usage, by competing on low cost), while the former builds upon existing strengths, primarily targeting collections of firms and economic activity rather than individual firms, and focuses on enhancing productivity (competing on high value). Regions need to be cautious about trying to "pick winners" or build clusters without a sufficient existing core, but (as discussed further below, under "governance") they can create the conditions in which new clusters are more likely to materialize, and emerging clusters thrive.[118] That is, practitioners and policymakers can undertake a variety of actions which at least reinforce the advantages of clustering, and the most effective actions will be highly place- and cluster-type-specific. Key aspects of this "menu" of potential strategies are highlighted below.[119] Not by coincidence, this menu naturally organizes itself into a framework that largely reflects the leverage points identified in Chapter II: since clusters are a core component of the production side of the economy, and the leverage points are designed to enhance production, it would be expected that the leverage points would particularly enhance cluster formation and performance.[120]

Foster Innovation and Entrepreneurship

As discussed, clusters by their nature have natural advantages with respect to innovation. To facilitate cluster-based innovation, regions can co-invest with cluster firms and networks to support cluster-specialized applied research and product development. Cluster-based innovation centers, driven by member firms and linked to local research universities, are an approach that is growing increasingly common at the regional level. For example, the research and development centers at several U.S. universities — Clemson University as well as the Universities of Alabama and Michigan — are linked directly to firms in their respective regions' automotive clusters. Internationally, the Stuttgart region is home to twelve Competence and Innovation Centers that act as innovation-catalyzing intermediaries.[121]

Similarly, studies of cluster development usually identify entrepreneurship — start-ups as well as spinouts from existing firms — as an important source of a cluster's growth and performance. Practitioners and policymakers often provide cluster-specific support for entrepreneurs by increasing the availability of venture capital through investing in existing private venture firms already targeting and knowledgeable about specific clusters or, less often, by directly investing public funds in selected companies.[122] Other entrepreneurship strategies can also be adapted, and are often more effective when targeted to particular clusters: helping entrepreneurs network with and support each other within particular broader cluster networks; creating cluster specific, low-cost incubator space; and providing highly cluster specialized firm-driven technical assistance.

Enhance Connections in Existing and Emerging Clusters

The vast majority of efforts to support regional clusters begin with some form of "mobilization strategy" through which emergence of a cluster-driven and -focused organization enables more deliberate and strategic interaction among the firms in a cluster, identifies challenges and opportunities for cluster development, and provides a range of services, information and networking opportunities to meet needs identified by member firms.[123] Establishing and strengthening links to organizations beyond the region can also be an investment in clusters' innovative capacity (as well as lead to attraction of firms and human capital that would benefit from co-locating with the cluster), through exposure to trends, operating environments and cultures different from those in the clusters' home region.[124]

Develop and Deploy Human Capital Demanded By Clusters

The local availability of specialized human capital — skills, knowledge, know-how, expertise and creativity relevant to the cluster — matters enormously in cluster development. Regions can develop the capacity of local technical and community colleges, leverage government-funded "industry cluster centers" or establish cluster-specific training to solve a cluster's skill-related problems and generate a flow of trained workers.[125]

Improve Governance

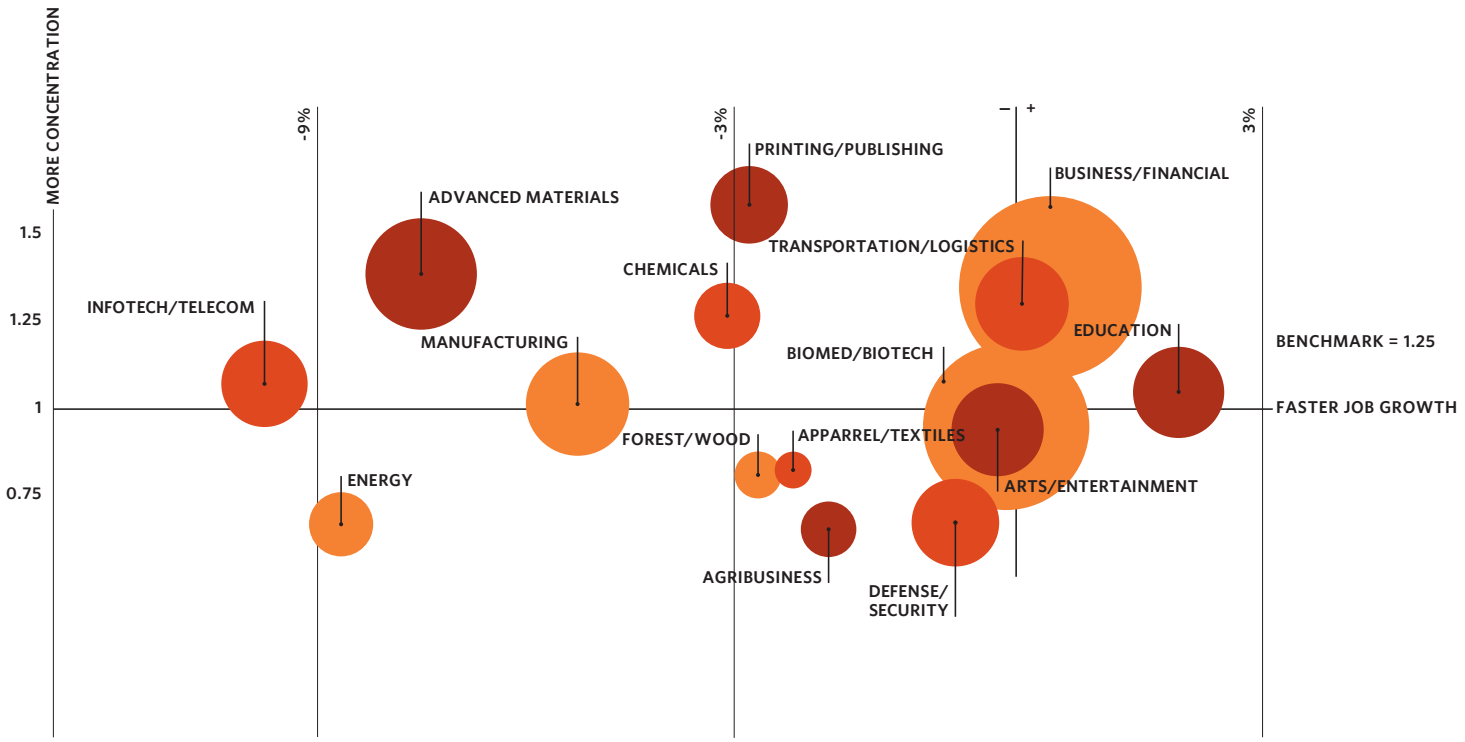
Local government first needs to shift focus from traditional, specific firm attraction strategies (e.g., "smokestack chasing") toward targeted strategies that build from strengths in existing or potential clusters. Governments that want to build enduring relationships with clusters need to be flexible in their delivery of services and provision of assistance to firms. Traditional bureaucratic models of government fall short when dealing with agglomerations of firms that exhibit complex relationships and need to adapt quickly to changes in the global economy. Rather than trying to change the behavior of firms, as is often the approach, government entities would be better served by altering their own behavior — for example, organizing their service delivery around clusters or staffing key programs with employees who have cluster expertise.[126]

A related issue in the field, which is often over-simplified or the subject of confusion, is whether government can or should "pick" clusters. Government provides foundational services and products (public goods) and creates a tax and regulatory environment that supports all firms, including the natural market emergence of clusters. It can then make more targeted activities and support available to clusters which have emerged, attempting to do this in ways which build from, facilitate and support the organic market process, rather than distorting it. (Where specific clusters create positive social externalities — e.g., locate and create disproportionate employment opportunities in distressed areas — there may be justification for targeting government resources in ways that are more "distorting" on the margins.) At the extremes, government cannot pick and generate a cluster out of nothing, nor need it refrain from making resources available to competitive clusters which have essentially picked and proven themselves. There is much complexity, and need for nuanced activity, in the middle, such as targeting policy and investments to build upon the region's unique strengths and fostering an environment that enables the emergence of new clusters.[127]

B. Impacts of GO TO 2040 Recommendations

In the course of developing the recommendations contained in GO TO 2040, CMAP has conducted preliminary analysis which identifies a set of eleven clusters based on concentration in the region, employment growth and potential (see figure on the following page). This preliminary identification is based on quantitative work (applying a nationally derived definition of what types of firms define particular clusters to data on firms in the region), and identifies the clusters in which the seven-county region has a greater concentration than the nation, on average.[128] The identified clusters span a wide range of activities, including business and financial services, advanced materials, transportation and logistics, arts and entertainment, chemicals and energy. The current state of information about each cluster varies and, as noted by CMAP,[129] much further analysis will be necessary. This preliminary analysis does not yet develop a nuanced understanding of the extent to which and how each identified collection of firms really operates as a functional cluster, the challenges to and opportunities for growing the respective clusters, and so forth. This more detailed understanding and engagement of the members of the clusters will be necessary in order to develop targeted policies related to increasing cluster performance.

As this nuanced cluster analysis is an intensive and long-term exercise, GO TO 2040 necessarily recommends prioritizing further exploration and strategy development for the identified set of regional clusters. Because of their particular potential to have a positive impact on the region's economy, four clusters have been preliminarily identified as among the first group for further research and action: freight/logistics, energy-efficiency goods and services and green energy, biomed/biotech and advanced manufacturing. Knowledge about and progress in the first two of these (freight/logistics and energy-efficiency goods and services) are currently furthest along and highlighted in the assessment of impacts that follows. More importantly for purposes of this report, however, most of the GO TO 2040 recommendations address factors that will naturally contribute to enhanced performance across nearly all clusters. The cross-cluster impacts and some of the cluster-specific impacts of GO TO 2040 are discussed below.



Sources: CMAP GO TO 2040 Plan, Illinois Department of Employment Security, Purdue Center of Regional Development

Impacts Across All Clusters

As mentioned above, it is not coincidence that the leverage points that support economic growth are virtually the same interventions that particularly enhance cluster performance. Since much of the nation's economic growth occurs within clusters in different regions, policies that enhance economic growth usually support clusters (and vice-versa). The ways in which the GO TO 2040-driven changes to the economic landscape will enhance economic performance through each of these leverage points are the subjects of separate chapters in this report, so are only summarized briefly here.

- **Foster Innovation and Entrepreneurship**
  As discussed in Chapter IIIB, GO TO 2040 (particularly through the changes to the economic landscape described in Chapter I, Characteristic 3) will develop appropriate human capital, boost knowledge networks and spillovers, improve the local institutional environment and "innovation culture" and increase financial support for innovators and entrepreneurs. As discussed above, all of these changes will particularly benefit local clusters.

- **Develop and Deploy Human Capital Demanded by Clusters**
  As discussed in Chapter VIB, GO TO 2040 (particularly through the recommendations described in Chapter I, Characteristics 3 and 5) will increase the local production of skilled workers aligned with local employer needs and will attract and retain workers through rich job pools (particularly employment opportunities created by cluster growth) and quality-of-life amenities. This kind of targeted employer-driven, high-quality human capital development aligned with job creation in existing and emerging clusters is key to strengthening clusters.

- **Improve Governance**
  As discussed in Chapter VIIB (particularly through the recommendations described in Chapter I, Characteristic 4), GO TO 2040 will increase the efficiency of local governments through increased coordination, cooperation and consolidation of services; balance tax and regulatory policies to deliver high-value public goods at a tax cost that provides businesses with a strong "return on investment;" and improve both the quality and availability of information to public and private stakeholders. In combination, these changes will enable more efficient and effective decision making and lower transaction costs for expanding market activity. In their implementation, some of these areas may yield results particularly productive for clusters (such as, for example, if coordinated regulatory incentives translate to specific measures that support emergence of the building energy efficiency cluster). However, the governance recommendations are generally not yet defined specifically enough to enable prediction that they will particularly help clusters (beyond the ways in which they will enhance performance of firms and the economy overall).

GO TO 2040's recommendations in the areas described above will strengthen the region's clusters, improving the performance of cluster firms and attracting new firms, thus driving economic growth. However, as noted, much more detailed analysis — including the more "anthropological" engagement of firms in the clusters to understand what firms and activities really constitute each cluster and their dynamics — is necessary to develop more cluster-specific strategies. Currently, the plan's treatment of clusters – and, in fact, of the production side of the economy more broadly — is quite minimal: it is included as a subset of the innovation chapter and provides little direction on specific strategies.[130] A critical next step, which is in fact one of GO TO 2040's implementation areas, will be to support this kind of analysis, engagement and development of cluster-specific strategies.

How much difference will strengthening local clusters make to the regional economy? Empirical research confirms that firms located in clusters tend to have higher productivity levels (output per worker), which translate into regional economic growth through both higher firm output and higher wages for workers. For example, one such study finds that manufacturing cluster workers in metropolitan areas earn an average wage premium of 6.2% above non-cluster manufacturing workers.[131] A second study measures clustering in terms of manufacturing industry and occupational specialization (share of metropolitan employment in a given type of manufacturing) and concentration (metropolitan share of national industry or occupational employment). The authors find that a one-percentage-point increase in industry specialization yields workers in that industry a 2.8% gain in wages, while a similar increase in occupational specialization earns workers in that occupation 3.7% higher wages. A one percentage-point increases in industry and occupational concentration yields wage increases of 0.59% and 1.5%, respectively.[132] Additionally, there is evidence that specialization in some service industries also raises real metropolitan wage per worker.[133] A key reason wages are higher in local clusters is because the firms, and workers, have higher productivity levels due to the benefits of the cluster.

Illustrative Cluster-Specific Impacts: Freight and Logistics

Freight transportation and logistics is a well-established and important cluster to Chicago's regional economy. Since the advent of the railroad era in the mid-nineteenth century, the Chicago region has been among the most significant freight hubs in North America.[134] The region's transportation history, market size and central location contributed to a strong network of rail and road infrastructure, which in turn gave rise to supporting facilities and services such as rail terminals, intermodal transfer facilities, distribution and warehousing facilities and transportation logistics and coordination services. As of 2007, the Chicago metropolitan area was home to more than 7,500 firms in the transportation and warehousing industries, a concentration of more than 25% above the national average.[135]

GO TO 2040 recognizes the freight and logistics cluster as one of the most important to the region's economic growth and prosperity. However, its current high-level analysis of industry concentrations, while a valuable first step for identifying regional industries for further exploration, does not yet provide a sufficiently nuanced understanding of the cluster's operation for developing cluster-specific strategies. The "drill-down" anticipated in CMAP's Implementation Action Areas[136] will help develop a more in-depth picture of how the cluster operates and what it needs to prosper.

At a more basic level, however, the quality of the region's infrastructure will of course be particularly important to the performance of this concentration of firms in freight and logistics services. As a result, the GO TO 2040 recommendations to improve the region's road and rail infrastructure (see Chapter I, Characteristic 1) — while not explicitly a cluster-specific strategy — will particularly facilitate improved performance of the freight and logistics cluster. Currently, cluster firms' performance is challenged by congestion of rail and roadways.[137] The effects of congestion are twofold. First, congestion increases the average time spent travelling per trip — this has a straight-line impact on costs. Congestion also, however, affects the variability of the amount of time spent travelling per trip. This decreases the efficiency with which vehicles can be deployed (fewer trips can be made within a given timeframe); increases time vehicles spend idling, increasing fuel consumption and costs; and increases delivery delays that can cut into transportation firms' revenue and profit margins. Delayed deliveries also cause negative impacts downstream for warehouses and distribution facilities, and local trucking companies awaiting shipments for intra-regional distribution.[138]

Enhancing the performance of the freight and logistics cluster will contribute substantially to economic growth in the region both directly through growth in the cluster itself and because of the benefits which a strong freight and logistics cluster confer on all firms and industries in the region that rely on these services (part of the "urbanization economies" discussed above). Strength in this cluster particularly contributes to the capacity of firms to expand to meet the demands of the "next economy," characterized by a number of economists, policy makers and thought leaders as increasingly export-driven.[139] While the extensive GO TO 2040 recommendations to improve road and rail infrastructure will support all clusters, they will have a particularly meaningful impact on this cluster by increasing cluster firms' efficiency and productivity through more streamlined and reliable freight movements.

Illustrative Cluster-Specific Impacts: Energy-Efficiency Goods and Services

The market for "green" goods and services is rapidly growing locally, nationally and globally, and building retrofitting in particular is emerging as a high-growth segment of the broader green marketplace. Promoting energy-efficiency goods and services is a significant focus of one of GO TO 2040's recommendations (Chapter I, Characteristic 3), which encourages retrofitting of buildings for energy and water efficiency and sustainably designed new construction.

The trend toward "greening" the activities of businesses and households will be a key characteristic shaping the next economy.[140] Beyond supporting the principles of resource conservation and environmental sustainability, the emphasis on greening is giving rise to whole new sectors of economic activity. While the outlines and definitions of these emerging sectors are still taking shape, they broadly include, among others, alternative energy production (e.g., wind farms, fuel cells, solar panels); new energy distribution and management systems (e.g., smart grid); production of more energy efficient goods (e.g., florescent light bulbs, better insulation); development of more energy efficient processes across the economy (e.g., goods and processes reducing industrial waste); and energy-efficiency retrofitting of residential, commercial and industrial buildings.[141]

Of these emerging sectors, retrofitting residential and commercial buildings is anticipated to be particularly large, and the Chicago region is well positioned to develop a strong cluster engaged in and supporting this activity. An active network of private, civic and public institutions has created the Chicago Climate Action Plan (CCAP), developed a Chicago Retrofit Strategy and is creating the products, services and "ecosystem" to support emergence of this cluster at scale. Market based activities, along with state and local policies, will generate substantial local demand supporting emergence of this cluster,[142] and CMAP is working with regional partners to develop and implement a large-scale, comprehensive retrofitting strategy — the Chicago Region Retrofit Ramp-Up (CR3) Program — with a heavy focus on supporting emergence of the private retrofit market.[143]

Achieving only the residential retrofitting goal expressed in the CCAP — 400,000 residential units in the City of Chicago alone – would generate economic activity upwards of $2 billion.[144] This activity translates into substantial job creation. For example, a recent study by Duke University forecast that if the southern region of the U.S. implemented nine "green" policies — including new appliance standards, retrofitting and weatherization and upgrades to utility plants — approximately 520,000 new jobs would be created by 2030.[145]

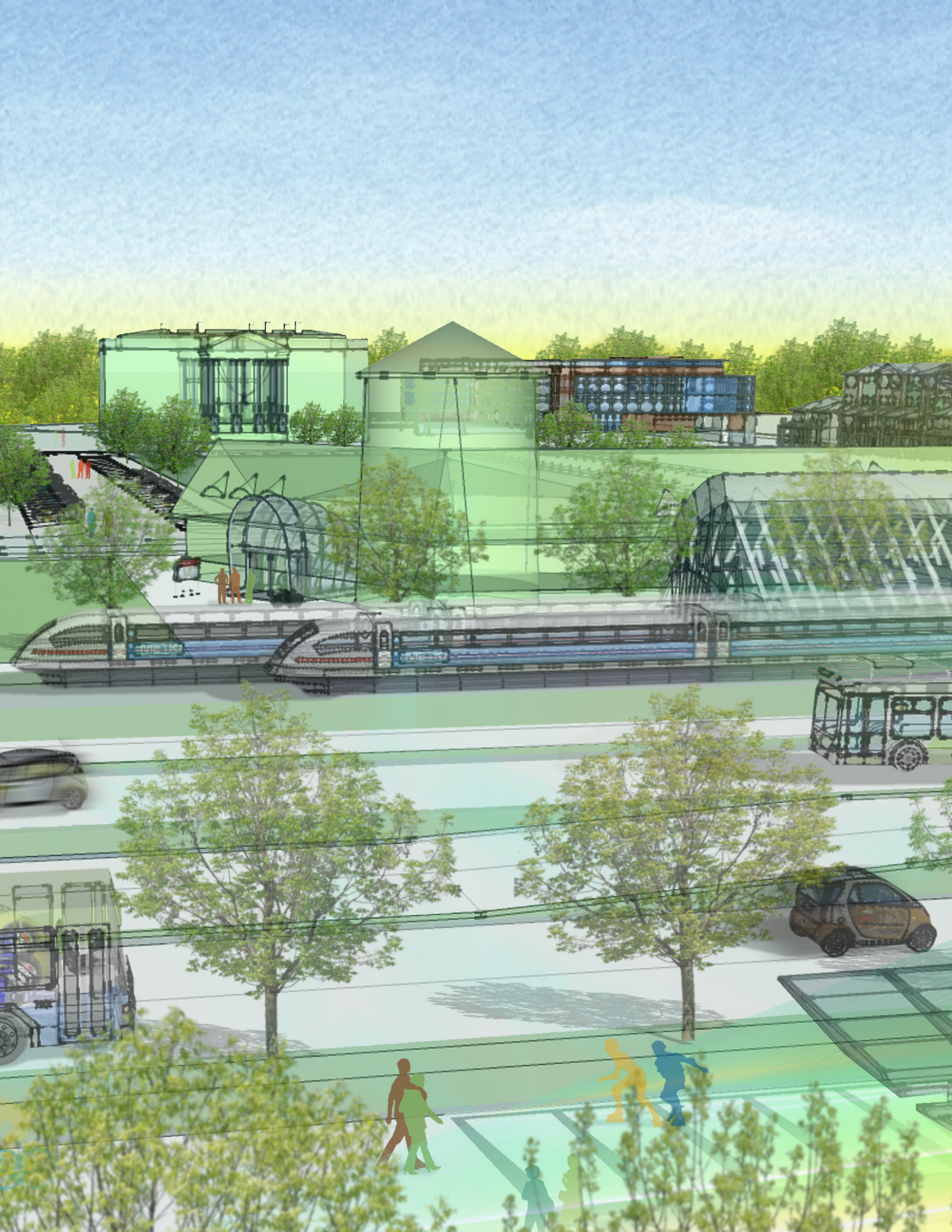
Further, businesses providing retrofit-related goods and services in the Chicago region may also be able to benefit from being "first movers" in the national, or possibly even international, retrofitting market.[146] Being at the forefront of the retrofitting market could provide businesses a crucial foothold in a very high-potential industry, as they gain valuable experience quickly and on a large scale, given the size of the regional market and variety of building types. This experience could then be leveraged as a competitive advantage in pursuing further retrofitting goods and services opportunities throughout the U.S. or internationally.[147]

Beyond the services needed to implement the region's retrofitting goals, growth of the retrofit cluster includes, overlaps with or will support emergence of related economic activity (particularly for the goods that support the retrofits). Retrofits can include a combination of improvements to the building envelope, heating and cooling systems, hot water systems and lighting,[148] all of which provide significant opportunity for businesses in metropolitan Chicago not only to provide the direct retrofit audit and contracting services, but also to supply a wide range of goods (such as tools, building materials and components). A study of the Chicago economy by Bain and Company found that the region has a competitive advantage, both in terms of current capacity and future potential, in green construction materials and services.[149] The demand that would accompany full-scale implementation of a regional retrofit strategy could serve to accelerate the growth of existing components of the green building and retrofitting industry, catalyze the transition of older-line industries into this high-growth field and spur entry of new firms.

Managing and conserving resources through promotion of building retrofits and sustainable design, as recommended in GO TO 2040, is obviously a well-chosen target for cluster-focused activity. CMAP recently led a collective effort of the emerging retrofit network which resulted in receipt of a $25 million Energy Efficiency Block Grant to support retrofit market development and implementation activities (CR3, mentioned above). The retrofit ramp up strategies are designed to support market emergence and cluster development through increasing demand, reducing transaction costs, improving the labor force, providing financing and other initiatives tailored to the building energy efficiency cluster. In short, this is an emerging cluster with vast potential that is poised to take off, and CMAP is already helping launch it.

More generally (beyond the work on these two clusters), as mentioned, the initial cluster analysis conducted by CMAP is a solid foundation on which to begin exploring the region's other clusters. The work conducted to date — analyzing relative concentration of particular industry groupings within the region — does not, however, provide sufficient information to drive strategic cluster-based policies and investment. A more nuanced — "anthropological" — analysis should be conducted, beginning with the highest-priority clusters, to determine which concentrations are truly operating as clusters within the region, precisely how they are operating and what opportunities for growth and intervention they offer. The initial quantitative analysis done by CMAP defines clusters based on national trend data about which types of firms tend to do business with each other, and then identifies the concentration of those collections of firms in the Chicago region. The analysis does not, however, examine whether firms in the Chicago area actually interact with each other in the ways indicated by national trends, or whether and what kind of variations appear in local practice. The next analytical step entails teasing out the potential clusters' specific member firms, and more importantly, determining the nature of the firms' actual economic relationships with one another and local government, civic and other institutions. This "cluster mapping" (identified in GO TO 2040 Implementation Action Areas as a "drill down" analysis) and understanding of the dynamics operating in a given cluster is the critical input to identifying high potential clusters and developing effective strategies for enhancing cluster performance.

Overall, the recommendations included in GO TO 2040 will facilitate growth of the region's existing clusters, as well as emergence of new, high-growth-potential clusters that build on the region's existing assets. GO TO 2040 is focused on the factors that matter to cluster performance — and on several of the clusters that matter most — and high cluster performance directly translates into a stronger economy.



CHAPTER V: Improving the Region's Spatial Efficiency

A. Definition and Significance

While efforts to drive regional economic growth typically focus primarily on the question of what economic activity characterizes a particular region (e.g., its industry and occupation mix, innovation capacity), increasing attention in recent years has been paid to the geographic organization of this activity.[150] As discussed in Chapter II, from an economic point of view, the very reason cities exist is to realize the agglomeration benefits occurring as the result of concentrating economic activity, specifically the reduction in transportation costs between firms and their suppliers, workers and consumers. Places that offer geographic proximity, density and accessibility among economic actors thus provide a more efficient arrangement of economic activity, resulting not only in lower transportation costs, but also facilitating shared labor pools, knowledge spillovers, increased innovation and other benefits that increase the productivity and efficiency of the regional economy.[151] Alternatively, an inefficient geographic arrangement of economic activity would result in high personal and freight travel times due to, for example, sprawl, traffic congestion, or the physical distance between economic actors. The term "spatial efficiency," then, is used here to characterize the spatial configuration of economic inputs and activities within a region, drawing attention to the effect it has on the performance of the regional economy.

The spatial efficiency of a region can be described primarily in terms of three types of economic relationships: worker-to-employer; business-to-business; and business-to-consumer.[152] It is likely that the optimal spatial distribution of these economic actors is highly nuanced and specific to a given region's size and mix of economic activity. Adding to the complexity of the issue, there are trade-offs between various aspects of spatial efficiency, as well as between spatial efficiency and other values such as quality of life or environmental health.[153] For example, improving the spatial efficiency of business-to-business interactions may negatively affect business-to-consumer or business-to-worker interactions. At the extreme, while it might reduce transportation costs for workers to live in factories, or for manufacturers to be located next to their retail outlets, these physical arrangements may impose negative externalities on households or society more broadly. Thus, optimizing spatial efficiency is complicated in its application; however, it is clear — and becoming clearer as people and firms increasingly prefer the density of cities[154] — that spatial efficiency is an important determinant of regional economic performance.

Worker-to-Employer

A spatial mismatch between the locations of jobs and of the housing where workers live can negatively impact economic growth through higher costs for both firms and workers, reduced labor market efficiency and increased social costs associated with the concentration of poverty.[155] Low-density development that exhibits a largely single-use zoning pattern — housing separate from retail, services and public facilities, particularly what is often referred to as "sprawl" — or development that excludes affordable housing from areas where jobs are available, increases transportation costs for commuters traveling to employment centers. In addition, the quality of the infrastructure, the availability of public transit and levels of congestion all affect workers' travel times and costs. Because travel time is one of the largest transportation costs for commuters, often worth more than the monetary costs of travel-related expenses, including gas, maintenance, and other operating costs,[156] employers may face higher labor costs in regions that exhibit spatial mismatch. For example, one study of the value commuters place on their time indicates that workers who travel about 45 minutes roundtrip to and from work would need to earn nearly 20% more money than they currently do to feel fully compensated.[157]

In addition to imposing time-consuming, costly commutes on workers, congestion and inaccessible transit also directly affect employers through the costs associated with increased employee turnover, absenteeism and lost worker productivity. A study of the Chicago region estimated that, in the absence of a dense and reliable transit network, the turnover costs to employers can add up to $200 to $300 million annually, with the burden especially heavy on businesses that hire large numbers of entry-level workers, who are especially sensitive to transportation costs.[158]

Further, spatial mismatch of workers and employers contributes to reduced access by employers to workers with desired skills and by individuals to jobs for which they are qualified. This can result in workers in jobs that do not fully utilize their skills and education or, in more extreme cases, otherwise employable individuals remaining unemployed.[159] On the personal level, this causes erosion of human capital and disenfranchisement from the labor market. On the aggregate level, it introduces inefficiency into the labor market in the form of underutilized human capital. Efficient utilization of the labor force is of vital importance to the region's economic growth: those regions that waste the fewest assets — human or otherwise — generally experience the highest levels of growth.[160]

Finally, worker-employer spatial mismatch also reflects and contributes to concentrations of urban poverty.[161] Many of the potential workers who cannot afford to live near jobs can only find housing in inner-city areas, and have lower incomes and car ownership rates. If jobs continue to be disproportionately created in the suburbs,[162] while affordable housing remains primarily in the inner city, willing workers cannot reach available jobs, causing inefficiencies in the job market.[163] While good public transit service can help alleviate this problem, it is often insufficient, particularly during the off-peak hours often worked by low-skilled workers,[164] posing further challenges to those unable to afford to buy and maintain an automobile.[165]

The absence of accessible public transit contributes to the economic isolation of inner cities, even cities in fast-growing regions, which impairs income gains and reductions in poverty.[166] Many of the social costs induced by economic isolation, such as crime and urban blight, have a ripple effect, increasing costs of government, while negatively impacting other economic activity (such as a disincentive to firm location), thus perpetuating a cycle of urban decline.[167]

Business-to-Business

To successfully compete, businesses need to transport goods, employees and ideas within and between their own offices and to other businesses up and down their supply chains, both within the region and outside of it. The time and money required to do so affect both their costs of production and, in some cases, the extent to which they are able to capitalize on agglomeration benefits. These transportation costs, as with those present in the business-to-worker relationship, are a function of both distance and travel time, affected by factors such as quality of infrastructure and levels of congestion.

Congestion levels are increasing in most metropolitan areas, and have resulted in lost productivity for firms through delayed delivery of raw materials and intermediate goods. Congestion also increases fuel usage, further enlarging the transportation component of firms' production costs.[168] More broadly, if the benefits of density are what lead to concentration of economic activity in cities, it is the ensuing congestion costs as density increases which present one limiting factor explaining why economic activity spreads out at all, within and beyond cities.[169] Minimizing transportation times and transportation trip-time variance[170] between businesses contributes to the enhancement of regional economic efficiency and productivity.

Reducing the distance to be traveled, through co-locating businesses in smaller geographies, can also improve the productivity and efficiency of firms. While most studies demonstrate the benefits of co-locating firms at a metropolitan level — from shared infrastructure, labor market pooling and knowledge spillovers — smaller concentrations particularly of knowledge-intensive sectors or functions, such as Research Triangle Park, may heighten these benefits by even further reducing transportation costs and enabling face-to-face interaction.[171] Generally, transportation costs can be reduced and agglomeration benefits enhanced by enabling firms to locate near their suppliers and key institutional partners (such as universities); by removing regulatory barriers (e.g., zoning restrictions); by providing special infrastructure (e.g., planned manufacturing districts); and by improving the regional transportation system.

Business-to-Consumer

Finally, the distance between retail firms and their consumers, and the quality of the infrastructure that connects them, affects the transportation component of businesses' costs of production as well as consumers' costs of consumption. Congestion, for example, through delivery delays and increased costs of the delivery of finished goods to the market, increases firms' production costs. On the consumer side, higher transportation costs leave individuals and households with less disposable income than they would otherwise be willing and able to spend on goods and services. From an economic perspective, then, transportation costs can reduce the number and type of economic transactions that occur by simultaneously increasing the costs of production and reducing consumers' willingness (or ability) to pay.

In general, transportation costs can be reduced through minimizing the distances between businesses and consumers by increasing dense mixed-use development, and through reducing travel times by managing congestion. This entails pedestrian-friendly communities, well-connected street networks, strengthening of public transit and full-cost pricing of transportation infrastructure. Specifically, land use patterns that support non-auto modes of transportation (transit, biking and walking) will reduce residents' reliance on private auto travel.[172] Combined with transit accessibility, a mixed-use pattern of development can decrease the number and length of trips that residents must take, through the geographic concentration of key activities and destinations.[173] Further, congestion — especially during peak travel periods — can be reduced by requiring drivers to pay directly for a greater portion of the true costs associated with use of various components of the regional transportation infrastructure. Various user fees, such as for highways and public parking, can alter the magnitude and time pattern of demand for those components for which users were previously paying what amounted to subsidized prices, reducing the number of vehicles on regional roadways.[174]

Overall, spatial efficiency increases the economic output of a region by minimizing the transportation costs and enhancing the benefits of spatial proximity among workers, businesses and consumers via a dense, mixed-use land use pattern and efficient transportation infrastructure (including public transit) linking relevant economic actors to one another.

B. Impacts of GO TO 2040 Recommendations

The Chicago region's performance on measures of spatial efficiency — both congestion and jobs-housing mismatch — leaves significant room for improvement. In terms of congestion, the region is among the most congested in the nation: third highest person-hours of traffic delays and second highest travel time index (ratio of peak-period travel time to free-flowing travel time).[175] This level of congestion costs the region approximately $7.3 billion annually in wasted time and fuel, an impact that is anticipated to become even more severe in the years ahead.[176] The region is also home to the two most congested freight-significant highway locations in the nation, as well as two other locations among the 100 locations monitored,[177] contributing to congestion costs for freight shippers of more than $1 billion per year.[178]

In terms of the relative locations of housing and employment opportunities, the region ranks 77th among the nation's 100 largest metro areas for housing affordability,[179] and nearly 69% of residents travel more than 10 miles to their places of employment. The region's fastest-growing employment centers are separated from a significant share of housing affordable to families earning the region's median income,[180] and existing transit service to suburban Chicago job centers and secondary central city neighborhoods is relatively poor.[181]

In other words, the Chicago region needs to pay attention to spatial efficiency. Fortunately, the Plan does. The recommendations articulated in GO TO 2040 will improve the spatial efficiency of the Chicago region and address the inefficiencies of the economic interactions outlined above to the extent that they:

- Minimize transportation costs
- Maximize agglomeration benefits
- Avoid segregation and the concentration of poverty

Minimize Transportation Costs

Overall, the recommendations in GO TO 2040 that address transportation and the built environment (Chapter I, Characteristics 1 and 2) will reduce transportation costs, and therefore enhance economic growth, by geographically concentrating investments in the built environment and by improving transportation infrastructure,[182] decreasing the need to travel via private auto,[183] providing increased access to efficient and reliable public transit and managing traffic flow on high-demand roadways and during peak travel times.

The recommended improvements to the region's freight rail and road infrastructure (Chapter I, Characteristic 1) will decrease the cost of moving goods between businesses and from businesses to consumers. The region's more than $371 billion in annual gross product[184] and consumer market of 8.6 million residents[185] make it both a point of origin and a destination for large volumes of intermediate and final goods. A modernized freight infrastructure network will mitigate the significant costs of congestion that are currently faced by local firms — including those related to the high variance in travel times — and that are expected to grow in the future if left unchecked. Further, improving both rail and road networks offers regional firms the ability to adapt shipping and receiving patterns to their specific needs, using the most cost-effective mode of transport.[186]

The GO TO 2040 recommendations related to strategic investments in public transit (Chapter I, Characteristic 1) will decrease transportation costs for individuals, particularly in their role as workers commuting to their places of employment. Commuting accounts for the bulk of the region's congestion-related costs ($5.1 billion of the $7.3 billion estimated total[187]), as many workers not only live outside the communities in which they work, but more than 70% drive to work alone.[188] Strategic investments in public transit will not only decrease these transportation costs to workers — allowing for realization of personal cost-savings — but they will also lower the associated wage, lost productivity and turnover costs to businesses, thereby increasing profitability and facilitating firm growth. In addition to the specific infrastructure investments, the transportation financing mechanisms recommended by GO TO 2040 (Chapter I, Characteristic 1) will contribute to economic growth by shaping the transportation decisions of households and businesses to make them more efficient, lowering per capita traffic congestion. These effects will lead to lower transportation costs for businesses and consumers as well as higher productivity, both of which will positively impact the region's economic growth.

While additional investment in public transit will have a positive impact on the regional economy, GO TO 2040's recommendation to explore the use of "value capture" mechanisms for its financing should be approached with caution, in order to avoid potential unintended negative consequences. Specifically, levying additional taxes or fees on transit-adjacent or transit-proximate properties, especially unimproved land, runs the risk of undermining efforts to promote affordable housing as part of transit-oriented development (unless the value captured is used for housing development subsidies), so can aggravate the problem of jobs-housing mismatch.[189]

The impact of the transit-related recommendations made by GO TO 2040 can be quite significant if effectively implemented. Small shifts from auto to transit, for example, can have a significant downward impact on auto travel, and consequently congestion, as measured by both reductions in vehicle miles traveled (VMT)[190] and a decrease in the overall probability of driving.[191] For example, a 10% increase in a city's rail transit service has been found to result in a 40-to 70-mile annual reduction in VMTs per capita.[192] Similarly, an increase of one transit passenger-mile is associated with an annual VMT reduction of 1.9 to 9 miles per capita.[193] Reductions in VMT translate to less roadway congestion, which will improve the efficiency and productivity of regional businesses, especially those that are heavily dependent on truck shipments,[194] increasing economic growth.

User pricing of infrastructure, such as the mechanisms recommended in GO TO 2040, can also have a meaningful impact on economic growth. For example, London's experience with congestion pricing finds that during the program's first months, it resulted in a 20% decrease in private auto traffic. Some commuters who still elected to drive — including wealthy commuters and those with a disproportionately high value of time, such as businesses making deliveries — shifted their trips to off-peak hours, ultimately contributing to a 37% increase in average traffic speed per day and a 30% decline in peak-period congestion delays.[195] Additionally, U.S.-based studies have found that a $1.37 to $2.73 increase in on-site (i.e., at workers' place of employment) parking fees reduced auto commuting by 12% to 39%. Similarly, differential parking fees for single- vs. high-occupancy vehicles (i.e., carpools), combined with transit and rideshare subsidies, could reduce total auto trips by 19% to 31%.[196] Thus, congestion pricing and increased parking fees represent practical methods by which to reduce levels of congestion.

However, it is worth noting that the use of infrastructure pricing mechanisms to manage the flow of traffic is a complex undertaking, with the potential for unintended negative consequences if the right balance is not achieved. Prioritizing public infrastructure for use by those most able to pay (i.e., businesses and more wealthy residents) may create situations in which individuals who must travel by car are unable to pay the higher auto-related user fees.[197] These circumstances would decrease spatial efficiency to the extent that lower-income residents' access to employment, education and other opportunities are constrained, decreasing the efficiency of labor markets and levels and productivity of human capital. A similar logic applies to certain businesses.

Finally, GO TO 2040's recommendations regarding the region's built environment (see Chapter I, Characteristic 2) will also contribute to reducing per capita traffic congestion and consequently transportation costs. The recommendations will help to reduce "sprawl" — or conversely, increase the density of development — which translates into growth in economic output and income. For example, doubling county-level density is associated with a 6% increase in state-level labor productivity,[198] and neighborhoods with the most interconnected, grid-based street networks result in 26% fewer vehicle miles traveled by residents, when compared to less-connected neighborhoods.[199] Similarly, a study that modeled the hypothetical impact of moving sample households from a city with measures of urban form and transit supply identical to those of Atlanta, to a city with measures equivalent to those of Boston, found that the differences in measures such as public transit supply, city shape and population centrality could lead to a 25% net reduction in annual VMTs.[200]

Maximize Agglomeration Benefits

In combination, the transportation and built environment recommendations of GO TO 2040 (Chapter I, Characteristics 1 and 2) can be anticipated to enhance the agglomeration benefits to firms by better connecting them to one another and to a range of shared inputs to production. As a common resource shared by all firms, the transportation infrastructure upgrades will enhance "urbanization economies" within the region, improving firm performance across a diverse range of firms. The freight infrastructure recommendations will provide better access to firms' supply chains and customers, while improvements to the public transit system put a deeper pool of labor within reach of local firms.

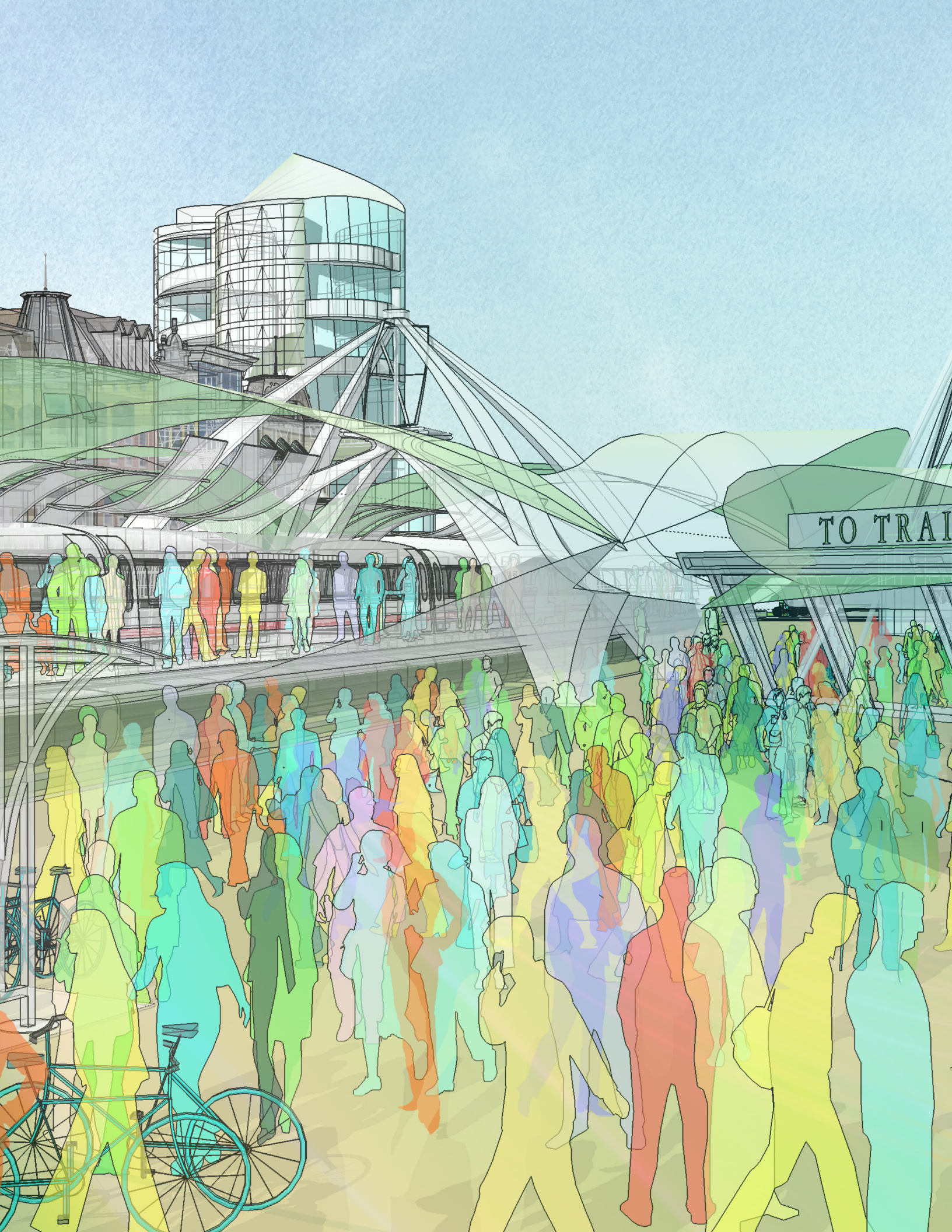
Avoid Segregation and Concentration of Poverty

The transit and land use recommendations included in GO TO 2040 (Chapter I, Characteristics 1 and 2) promote the socioeconomic inclusion that facilitates deployment of all the region's economic assets. Encouraging communities to become more mixed-use, mixed-income and transit-accessible will make job opportunities, as well as basic goods and services, more accessible to minority and low-income workers and make qualified workers more accessible to potential employers. These types of communities will enable more efficient deployment of the region's workforce by facilitating fuller participation in the labor market.

While the transit and land use recommendations will enable all workers to better match their residential and workplace locations to take advantage of dense neighborhoods with transit access, they may particularly benefit low-income households in the region. Recommendations that provide opportunities to live in neighborhoods that were previously beyond their financial means and investments that make public transit a more viable commuting option will link low-income workers to the job centers and educational institutions that would otherwise be beyond their geographic reach. This will facilitate more efficient deployment of this under-utilized segment of the regional workforce.

GO TO 2040's land use and housing recommendations could go further, however, toward addressing the spatial mismatch of jobs and housing. The magnitude and impact of this issue are identified in many places throughout plan,[201] but recommendations that relate to facilitating a more balanced distribution of housing options throughout the region are primarily process-based: funding for comprehensive planning and technical assistance; inter-governmental coordination; and policymaking that link transportation, land use and housing. The recommendations emphasize local control over land-use decisions and the need for context-specific solutions for incorporating affordable housing. These points are legitimate and important, but do not preclude the provision of — or acknowledge the need for — a regional economic framework and particular programs with which to understand and address the mismatch of jobs and housing. Going forward, offering evidence of the economic benefits of addressing the mismatch, and recommendations and implementation assistance with respect to the types of policies and programs that communities can implement to address it — from employer-assisted housing to density bonuses for new developments providing affordable units — would be valuable contributions to the regional economy.

Overall (and not surprising, considering CMAP's origins), the GO TO 2040 recommendations with respect to transportation and land use (Chapter I, Characteristics 1 and 2) are among the plan's strongest, and reflect more detailed and specific projects which will considerably improve the spatial efficiency of the region by reducing transportation costs for businesses and households, increasing agglomeration benefits to businesses and reducing segregation and concentration of poverty. These impacts will facilitate greater economic growth in the region, as inputs and exchange of labor, goods and ideas will occur more efficiently and at lower costs.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CHAPTER VI: Developing and Deploying Human Capital

A. Definition and Significance

Labor is one of the main inputs to economic production, and extensive work has documented the primary importance of the quality of labor, or human capital, to economic growth.[202] Human capital refers to the stock of knowledge, skills and expertise embedded in the labor force.[203] Workers acquire human capital through formal education and training, on-the-job training, work experience and other forms of learning, which when deployed in a job, leads to increased levels of labor productivity. As a result, economies with larger total stocks of deployed human capital experience more and faster gains in productivity and, by extension, economic growth.[204]

In the context of technology development, globalization and other facets of the "knowledge economy,"[205] economic productivity has become even more reliant on human capital. While higher levels of human capital lead directly to productivity gains, as well as innovation and entrepreneurship,[206] the interaction of human capital and technology further amplifies productivity, as higher-skilled workers take better advantage of new technologies. This interaction generates additional technological change, further compounding the productivity of the labor force. As a result, the value of output per U.S. worker has increased more than ten-fold over the last century.[207] Due in part to these dynamics, human capital (as measured by educational attainment) was the single biggest driver of economic growth in metropolitan areas across the 1990s.[208]

In the knowledge economy, the benefits of concentrating economic activity in metropolitan economies apply particularly to concentrating human capital. Skilled workers deployed in dense, urban areas generate more economic output than similarly skilled workers in less dense areas.[209] This advantage is derived from two principal effects. "Knowledge spillover" effects arise as knowledgeable, experienced workers interact with each other and move between firms, exchanging and generating new knowledge.[210] In addition, thick labor markets enable more efficient sorting of workers into jobs, resulting in better firm-worker matches.[211] For all of these reasons, human capital was the single biggest correlate of economic growth in metropolitan areas across the 1990s.[212] Regions with higher levels of human capital experience greater increases in worker productivity,[213] wages and employment growth.[215]

The prevalent and compelling statistical research linking high levels of human capital, generally measured by educational degrees, to high levels of metropolitan economic performance has often led practitioners to conclude that simple production of more human capital will lead to economic growth. However, it is not simply increasing levels of human capital which *causes* economic growth. To do economic development, we need to understand the operational relationship between human capital and growth.

Human capital contributes to economic growth as an input to production. Increasing amounts and levels of human capital drive growth by increasing the productivity of firms and, consequently, their output. The key point is so obvious that it is often overlooked: human capital contributes to growth by being deployed in jobs. For similar reasons — because workers go to places where their skills can be well deployed — jobs are also critical to retaining and attracting human capital. From an economic growth point of view, simply having a high level of human capital is not sufficient: the goal is high levels of *well-deployed* human capital. This means that, in order to maximize development and deployment of human capital, practitioners have to focus on the complex relationships between (1) production, attraction and retention of human capital; (2) job creation through firm growth, attraction and retention; and (3) the structure and efficiency of labor markets.

In exploring how best to maximize development and deployment of human capital, we begin by addressing several common misconceptions. In short, it turns out that the mechanisms for developing human capital (production, attraction and retention), and particularly for deploying it well, are much more a function of creating the right job pools and of labor market dynamics, than just of the educational systems which produce human capital or the quality-of-life amenities which contribute to its retention and attraction.

Misconception #1: Producing more and higher levels of human capital is itself the primary cause of economic growth.
As discussed, regions with higher levels of human capital generally experience greater economic growth. However, the necessary mechanism through which human capital realizes its economic value is by increasing the labor productivity of workers employed in jobs, through increased levels of innovation, better use of technology, knowledge spillovers and so on. Deployment in occupations that effectively leverage workers' skills is the mechanism through which capability is converted into increased productivity and, consequently, economic growth.

As a result, two metropolitan economies may have the same amount and quality of human capital, but the one that offers rich job pools and more productively deploys workers' skills and knowledge will experience greater economic growth. Consider for instance, "college towns," which, not incidentally, are frequently statistical outliers in human capital research. While they have among the highest levels of human capital, they generally do not have the largest, most productive or highest-growth economies.[216] The very high level of human capital embedded in professors is deployed for critically important purposes (such as production of human capital in students) other than maximizing its value in local economic growth.

Focusing on *deploying* human capital is not to diminish the importance of strategies that strive to increase the production of human capital. As discussed below (see "Misconception #2"), firms and knowledge workers attract each other in an iterative and mutually reinforcing process — knowledge workers are attracted to rich pools of knowledge jobs, and firms, in turn, are attracted to rich pools of knowledge workers. For this reason alone (as well as many non-economic reasons), increasing production of human capital is never a mistake. The point, though, is that it is not enough to drive economic growth.

The fact that deployment is what counts for economic growth raises several other practical issues. In order to maximize impact on regional economic growth, it is not just that the skilled workers must have jobs, but that they must be engaged in occupations that most productively deploy their human capital. For example, if a newly minted PhD scientist works at the checkout counter of a grocery store, the regional economy fails to maximize his or her potential economic value-added, and the worker is unable to employ her knowledge and skills to maximize earnings. This may occur because of labor market inefficiencies, if for example labor is underemployed because transaction costs[217] prevent efficient matching of workers and jobs. It may also occur because the jobs simply are not there. Both reasons entail, again, a need to also focus on the demand side of the labor market as well as the market's efficiency if practitioners are to maximize deployment of human capital.

Misconception #2: Retaining and attracting high-skilled human capital is primarily achieved through improving quality-of-life and consumption amenities.
Retaining and attracting human capital is a critical component of any comprehensive regional human capital strategy: if a region produces lots of human capital that then moves elsewhere, it of course does not get deployed in and contribute to growth of the regional economy. Similarly, if a region does not attract human capital, it cannot be deployed for economic growth.

A well-known body of research emphasizes the role of quality-of-life factors — such as access to quality performance venues and restaurants, tolerant attitudes and safety — in determining where high-skilled workers[218] choose to locate, and so suggests that the primary strategy for retaining and attracting them should be to improve amenities.[219] While amenities *do* contribute to location decisions of knowledge workers, the magnitude of this impact is significantly smaller than the impact of the availability of high-skilled jobs and a thriving local economy.[220] Knowledge workers have spent considerable resources and time acquiring skills and qualifications, and they seek to locate in metropolitan economies where they can effectively deploy their human capital and receive a high return on their skills, in the form of wages.[221] More broadly, they look to locate in places that offer rich job pools in which they have a range of opportunities to deploy their talents, and accompanying rich pools of knowledge workers, benefiting from the ensuing knowledge spillovers and enhanced productivity.[222] Amenities and other factors are important, but jobs are much more important.[223]

In light of these dynamics, attracting and retaining skilled workers primarily depends on identifying, creating and enhancing the job pools necessary to effectively deploy their talents. As workers are attracted to job pools that provide a strong return on their skills, firms are attracted to deep pools of high-quality human capital that can be productively deployed to increase firm performance. Firms and skilled workers thus attract one another in a mutually reinforcing, iterative process.[224] This need to create a thriving knowledge-based economy requires that human capital strategies also encompass, or be closely linked to, strategies addressing the demand side of the market (discussed in other chapters, particularly Chapter IV, about enhancing local industry, functional and occupational concentrations).[225]

Misconception #3: Formal educational attainment levels adequately reflect the human capital attributes that are most relevant to employers, and should be the primary focus of human capital-related economic growth strategies.

Since educational attainment data sets are more readily available, and they may serve as a sufficient proxy for human capital in aggregate statistical analyses, formal educational attainment (e.g., receipt of high school diploma, college or advanced degree) is a primary focus of the research on human capital. As these findings have been translated into practice, they often result in human capital development strategies focusing primarily on increasing formal educational degree attainment. In the real world, however, while formal education is an integral component of human capital development and is the basis for later skill attainment, it does not represent the sole — or perhaps even most significant — source of knowledge and skills contributing to labor productivity.

Workers also acquire and build skills through work experience, on-the-job training, workforce development programs, mentoring and so on. This rich combination of formal and informal learning experiences endows them with expertise and skills not produced by formal educational institutions, nor captured by educational attainment measures. This is particularly true, of course, for workers who have not gone through traditional educational institutions. As workers settle into a particular occupation, they acquire unique industry-specific skills, which ultimately contribute to greater worker productivity over time.[226] Additionally, "non-cognitive" skills such as motivation, discipline and perseverance, have been found to increase productivity as much as, and sometimes more than, cognitive skills measured by traditional educational attainment.[227] Employers understand the value of these other types of human capital and frequently rank "attitude" (i.e., non-cognitive skills), previous work experience and industry-based credentials above years of schooling when hiring new employees.[228] These dynamics help explain why workers with the same amount of formal education exhibit almost as much variance in wages as individuals across the entire workforce.[229] Formal education is an important component but not the sole contributor to the complex mix of skills developed throughout a worker's life and career that impact overall levels of productivity.

Formal education provides the foundational knowledge and skills that shape later skill attainment in the workforce[230] and significantly impact individual labor market outcomes.[231] For particular jobs — especially highly technical ones — the skills and abilities conveyed by formal educational attainment are primary drivers of worker productivity. For these and many other reasons, promoting the highest levels possible of formal educational attainment is of course valuable. However, equally important human capital is attained in many other ways. As the knowledge-based economy advances a culture of lifelong learning, and job requirements increasingly call for constant upskilling of workers' abilities, industry-specific and "non-cognitive" skills comprise an important part of continued skill development for both incumbent and emerging workers.

Therefore, strategies to develop human capital need to address not only the foundational skills acquired as part of formal education, but also the other skills that enable workers to be deployed in jobs that the region has and can grow. For purposes of maximizing development and deployment of human capital for regional economic growth, this over-emphasis on formal degrees in both human capital production and hiring has two implications: (1) we may be undervaluing and under-producing the industry-specific and non-cognitive human capital not obtained through degrees; and (2) to the extent potential employers cannot as readily find and evaluate this non-degree based human capital, it is being less efficiently deployed. The discussions below concerning employer-driven training and enhancing labor market "matching" efficiency are both addressed to these issues.

The theme underlying each of these three misconceptions is that human capital cannot contribute to regional economic growth unless it is effectively deployed. And understanding the mechanisms through which human capital is developed and deployed requires broadening the focus well beyond college production and amenities to encompass strategies which foster and link skilled workers to rich and diverse pools of jobs.

Clarifying these misconceptions to better understand the mechanisms through which human capital translates to economic growth suggests three areas of strategies that regions can employ to more effectively develop and deploy human capital for economic growth: (1) increase levels of human capital through production, attraction and retention of skilled workers; (2) improve the efficiency of labor markets; and (3) foster an "opportunity rich" economy with a diverse mix of jobs for all skill levels, multiple entry points to the labor market and opportunities for upward mobility.

Production, Attraction and Retention

Human capital production — from pre-school through worker retraining and lifelong learning — of course remains critically important. The key point is that to increase regional levels of human capital in a way that maximizes economic impact, production strategies should be (1) targeted to the particular needs and characteristics of different segments of the population; and (2) targeted to the current and anticipated needs of employers. For incumbent workers, job seekers and the emerging workforce (i.e., students), strategies should address the critical need to increase educational attainment levels, as well as to provide workers with continued access to education and training programs that produce the "right" human capital to meet the demands of local industries and employers. This demand-driven emphasis increases the likelihood of effectively deploying and better leveraging workers' skills to increase labor productivity in the regional economy.

With the intense emphasis on attraction and retention of knowledge workers (discussed further below), strategies to upgrade and better utilize the skills of the existing and emerging workforce may be getting less attention than they deserve: these strategies can equally contribute to increased productivity in the economy.[232] Addressing human capital development of the emerging and existing work

force with a focus on improved labor market outcomes increasingly requires policies and programs that span from birth through the arc of a career. While strategies or reforms to improve the production of human capital within the formal educational system are well beyond the scope of this paper, a few observations follow.

The production of human capital begins with investments in early childhood, primary and secondary education, which lay the foundation for subsequent educational and skill attainment.[233] Research indicates that high-quality early-childhood education improves later school achievement and job performance, particularly among children at risk of school failure.[234] Educational attainment at all levels (while, as discussed, not the only or necessarily most important source of human capital) is critical to promoting positive labor market outcomes.[235] A high school diploma is no longer sufficient to meet the skill requirements of today's job market,[236] and the lifelong learning culture of the knowledge-based economy frequently calls for workers to receive additional postsecondary education and training throughout their careers.

Comprehensive human capital development strategies must therefore promote post-secondary training and education opportunities that are accessible to workers no matter the skill or income level. In short, from a regional economic development standpoint, in addition to attracting and retaining knowledge workers, strategies to enable and encourage workers of all skill levels to pursue additional education and training will contribute to greater output per worker and ultimately regional economic growth.

For increasingly mobile knowledge workers, strategies particularly need to focus on attraction and retention, which means creating and tying them to knowledge jobs (as discussed in Misconception #2, above). Access to high-skilled jobs, particularly in cutting-edge technology sectors or knowledge-intensive industries like finance, insurance, business services and real estate,[237] is even more influential in the location decisions of the young and single cohort of college graduates.[238] Therefore, regional economies must actively identify and enhance high-growth concentrations of knowledge industries, occupations and functions, a strategy discussed in more detail in Chapter IV, "Enhance Performance of Existing and Emerging Clusters." Aspects of innovation and governance, particularly the institutional and business climate, (see Chapters III and VII), similarly address creation of the right jobs to attract and retain high-skilled workers. A much closer local integration of human capital and cluster strategies would make both more effective: emerging clusters often focus on common human capital needs, creating the opportunity to better target human capital production, retention and attraction around particular emerging job opportunities. Finally, with respect to attraction and retention, amenities may also play a supplementary role in human capital strategies, particularly if a regional economy already has the high-skilled jobs available that predominantly influence location decisions.[239]

Labor Market Efficiency

Effectively deploying human capital into jobs is a function of labor markets. Focusing on labor markets highlights two challenges: (1) transaction costs which may result in under-deployment of certain segments of human capital; and (2) poor information "signaling" of current and emerging job demand, resulting in inefficient production (e.g., training for the wrong jobs) and matching. These two challenges are related, particularly in their solution: better tying production and demand both reduces transaction costs and improves signaling.

An efficient labor market enables firms and workers to easily find and evaluate each other to form mutually productive matches. A critical component of firms' transaction costs is finding and identifying workers with the "right" skills to productively contribute to firm output, while workers' transaction costs are driven by the search for jobs that leverage their skills and the need to effectively signal relevant skills to employers.[240] Transaction costs are becoming more important in an increasingly knowledge-based and globalized economy, where the complexity and frequency of labor market transactions have increased.[241]

Historically, many firms recruited workers for entry-level jobs and invested in internal training programs that formed career ladders leading to advancement.[242] However, the increased mobility of human capital in recent years has led employers to under-invest in training,[243] placing the onus to develop industry-specific skills and effectively signal these skills to employers — especially for low- and middle-skill workers[244] — increasingly on the individual. At the same time, the rapid pace of change in industry and technological skill requirements makes this more difficult — as more sophisticated understanding of industry trends and dynamics is needed to guide effective skill development, and the complexity of skill sets that need to be matched to jobs and signaled to employers increases.[245]

As a result, there is an important role for third-party training programs — sometimes referred to as "labor market intermediaries" ("LMIs") to help workers and firms navigate the labor market and manage the higher volume of transactions.[246] By focusing on a particular industry or sector, LMIs are frequently able to achieve economies of scale related to information collection, acquiring an expertise that would be costly and difficult for individual workers or firms to develop on their own. As "middlemen," LMIs look to the needs of both workers and employers, helping them find each other and form productive matches in the face of rapidly changing market conditions, increasingly complex skill sets, and imperfect information. In the case of workers, LMIs might advise on types of jobs available, the skill sets necessary for specific jobs, how to acquire those skills (if necessary) and signal them to employers. For firms, LMIs may reduce costs in human resource departments and shorten the employee search and hiring process by presenting a pool of qualified candidates. In sum, labor market intermediaries can help minimize the transaction costs to both firms and workers of forming productive matches.

For segments of the labor force where transaction costs are especially high, LMIs are particularly important in promoting an efficient labor market. Employers necessarily often rely heavily on formal degrees and personal networks to find and assess potential employees. This tendency is partly due to a lack of standardized and reliable measurement tools for many industry-specific and "non-cognitive" skills, but also decreases the transaction costs associated with lengthy searches. As a result, if otherwise qualified workers do not acquire their knowledge and skills through formal institutions or are not as "plugged in" to employer personal networks, they will be under-deployed, creating labor market inefficiency and wasted economic assets.[247] Successful LMIs can help substitute for poor social networks by vetting and training workers for a specific job or industry and directly presenting and "certifying" job-ready applicants to employers.

The challenge of reducing assessment costs is more broadly being met by development and implementation of certification programs.[248] Certification acts as a clear signal to employers of workers' abilities, and allows job seekers to assess and signal their skills to firms, which is particularly important in an economy where a high school diploma no longer consistently signals basic literacy and numeracy skills[249] or "job-readiness" workplace skills.[250] Programs can address either these foundational skills or those required for specific industries or occupations.[251] To the extent that industry-specific skills standards are aligned with foundational basic skills standards, clear linkages can be formed between remedial, academic and occupational programs, providing a pipeline of qualified workers to participating industries.

To the extent that certification is available for specific jobs or industries, it has been shown to improve labor market outcomes, particularly for those lacking a four-year college degree. Among students that do not attend four-year colleges, workers that receive industry certification earn significantly higher subsequent wages than peers with general associate's degrees or those who took courses in the humanities, especially if certified in high-growth industries.[252] Making students and incumbent workers aware of the financial benefits of attaining qualifications can improve both individual outcomes in the form of increased wages, and regional outcomes in the form of improved labor productivity and decreased jobs-skills gaps.

A related, broader challenge underlying the efforts of all stakeholders interested in decreasing the transaction costs of matching is access to and the ability to analyze accurate and timely labor market information to assess imbalances in regional labor supply and demand. Efforts both to increase the demand-driven nature of human capital production and to improve labor market efficiency require such information. Specific demand-driven training programs can overcome this information challenge by directly consulting with local employers or industry associations about the skills needed for specific positions. At a regional level, however, a lack of data on both human capital levels and the skills demanded by employers makes it difficult for practitioners and researchers to diagnose larger trends in jobs-skills gaps. This limitation makes it more difficult to effectively tailor training for particular population segments and jobs, contributing to serious mismatches between the distribution of jobs and the skill qualifications of the regional workforce.[253] Timely and detailed data on local skills and job requirements is especially critical now as a result of the structural changes occurring in the economy.

Opportunity-Rich Economy

Recent political and policy discussions have suggested that "opportunity-rich" economies, which support strong middle-class earnings and opportunities for upward mobility in the labor market, will be the ones that grow and prosper the most in the post-recession U.S. economy.[254] While still a new topic that has yet to be fully explored, there are several lines of economic and political reasoning that underscore the importance of promoting these characteristics in regional economies.

At the most basic level, a labor market that allows for meritocratic economic mobility — either upward or downward — will best match workers to jobs that fully leverage their skills, helping to maximize labor productivity.[255] Barriers to mobility, on the other hand, may result in wasted economic assets by underutilizing human capital.[256] Opportunities for professional and economic advancement also help alleviate high concentrations of poverty, which research indicates negatively impacts long-term regional economic outcomes.[257] In addition to these direct economic implications, mobility also plays a critical role in helping create and foster a strong middle class.[258] A vibrant middle class positively impacts long-term regional economic growth,[259] including as an important driver of consumption for services and products.[260]

One way to increase upward mobility for workers is through "career pathway" programs that provide incumbent workers and job seekers with the necessary training and credentials to secure higher-skilled and better-paying jobs in regional industries or occupational clusters.[261] "Career pathways" align existing resources across education, workforce development and social service sectors — adding new services where gaps may surface — to form a clearly defined series of steps for workers to advance from basic or remedial education to entry-level positions and beyond. Education and training requirements are coordinated with industry standards, including any necessary certification, credentials or licensing, so that each step leads

to successively higher levels of employment in the targeted sector. A few innovative "career pathway" programs even integrate course work leading to academic credit and industry-recognized credentials directly into the work setting,[262] through partnerships between employers, education and training institutions. By providing workers with detailed information on how to attain the skills necessary for higher-paying jobs, while simultaneously offering financial and other supports during participation,[263] "career pathways" enable workers to gradually advance in the labor market over time.

The notion that becoming "opportunity-rich" is important to economic growth deserves attention, but a great deal more work is necessary to understand how to get there, and perhaps even what it precisely means. It seems an area in which practitioners are often ahead of policy and research, and that offers key opportunities for further research and product development, and ultimately for new strategies to strengthen regional economies.

In sum, efficiently and productively deployed human capital is the key driver of growth in the knowledge economy, and depends at least as much on having the right job pools and an efficient labor market as on simply producing human capital. As a result, several of the other leverage points (clusters, innovation, etc.) are critical to the productive deployment of human capital into appropriately matched employment opportunities, and play an important role in its long-term contribution to economic growth.

B. Impacts of GO TO 2040 Recommendations

The Chicago region is home to rich, knowledge economy job pools, with strengths in management, business and financial services, computer and mathematical occupations and the legal field, among others.[264] The region's workforce also exhibits high levels of educational attainment, surpassing the national average and ranking in the top quartile of the 100 largest U.S. metropolitan areas on both four-year degree-holders (33.0%) and advanced degree-holders (12.5%).[265]

While the region has strong knowledge economy jobs and a high human capital workforce, there is room to continually improve production, attraction and retention of the "right" human capital to match current and future job opportunities. Access to early childhood education is uneven, as evidenced by the fact that only 44% of three and four-year old children from families earning less than half of the state median income were enrolled in preschool, compared to 66% of those from families earning over 125% of the state median income. Attainment of secondary education credentials is also subpar: across the seven-county area, an average of 11.85% of adults aged 18-64 do not have a high school diploma or GED (with a high of 17% in Cook County), and the average 2007 high school graduation rate was only 85.7% (with a low of 78% in Cook County).[266] These statistics reflect an unfortunate trend of an increasing jobs-skills mismatch in Illinois. While 52% of all Illinois' jobs are middle-skill, meaning that they require a high school diploma and some post-secondary training, in 2008 there was a 9% shortfall in workers with the training necessary to fill them.[267]

Production, Attraction and Retention

In general, the policies in GO TO 2040 are appropriately focused to improve the development and deployment of human capital in the region.[268] Ensuring more equitable access to the Illinois Preschool for All program and improving the quality of the P-12 education system will help increase foundational educational attainment.[269] Additionally, encouraging partnerships between higher education institutions and employers will help align the knowledge and skills of the workforce with the needs of local employers (producing more of the "right" human capital), especially those experiencing worker shortages,[270] and will make more individuals "employment-ready,"[271] increasing the quality of the region's human capital and facilitating deployment of these previously underutilized human assets into productive economic activity.

Increasing both average educational levels and the region's proportion of college graduates (particularly among minority populations)[272] will have a positive impact on regional productivity, wages and employment growth, to the extent that the human capital is deployed in jobs that effectively leverage workers' skills and experience. Human capital production strategies should be closely coordinated with cluster-based job creation strategies (discussed further below) to ensure that the benefits of tailored training programs are fully realized. Research indicates that a one-year increase in the average educational attainment of individual workers in a metropolitan area increases total factor productivity by about 3%,[273] productivity in manufacturing jobs by 8.5%, and productivity in non-manufacturing jobs by 12.5%.[274]

As a reflection of this enhanced productivity, wage levels increase. One of the first economists to formally study the relationship between human capital and wages, Jacob Mincer calculated that workers' individual annual earnings rose by 7% across the 1950s and 1960s for every year of additional schooling.[275] More recently, Hungerford and Wassmer report that, as of 2001, high school graduates earn about 6% more than those without a high school diploma, and college graduates earn 65% more than high school graduates.[276] In addition, knowledge spillover effects from a one-percentage-point increase in a city's overall portion of college-educated residents results in a 0.6% to 1.2% increase in average worker wages.[277]

In addition to addressing the production of human capital, GO TO 2040 also addresses quality-of-life factors and efforts to promote "livable" communities, which will help attract and retain high-skilled workers on the margins.[278] However, as previously mentioned, the plan does not sufficiently focus on job creation (necessary for retention and attraction). The plan's preliminary work and recommendations on clusters, and its innovation recommendations,[279] take key steps in this direction, but implementation in the area of improving deployment of human capital will require considerable additional focus on strategies for creating the rich job pools that are critical to attracting, retaining and productively deploying human capital, as well as on the structure and efficiency of the labor market.

Labor Market Efficiency

GO TO 2040's recommendations also address the issue of improved labor market efficiency. Recommending that higher education institutions strengthen partnerships with employers provides an appropriate emphasis on the importance of employer-driven education and workforce development programs. These could result in more strategic production of the "right" human capital, as well as better prospects for productive deployment in local jobs, thus aiding efforts to retain skilled workers. This recommendation will enable higher education institutions to better identify the knowledge and skills required for employment, align curricula with those goals, provide students with skills demanded by private industry and leverage relationships with specific industries to increase internships, summer employment and work-study opportunities. One effect of doing so will be to lower firms' assessment costs, as students will have completed curricula they co-designed, and firms can easily recognize their relevant skills. Moving forward, labor market intermediaries (LMIs) like those described above or other types of public-private collaborations (i.e., beyond employer-higher education partnerships) should be created and strengthened as well, including to expand the range of skills for which employer-driven training and certification is available (e.g., for individuals involved in energy and water efficiency retrofits, as described in the "Livable Communities" implementation action areas of GO TO 2040). These could include expanding and improving formal partnerships between private-sector employers and workforce development, economic development and human service agencies.

In addition to formal partnerships with the private sector, GO TO 2040's recommendation to collect and analyze better data about labor market and industry trends to guide decision making in the education and workforce development sectors will help align services with employer needs, and could further reduce employer and worker transaction costs, critically improving labor market efficiencies. These efforts will help facilitate productive firm-worker matches, lowering the transaction costs associated with sorting for both firms and workers, and help retain high-skilled workers by providing opportunities for them to effectively deploy their human capital in the regional economy. Moving forward, particularly as better information is developed, it should be possible to further strengthen and focus employer-driven training programs, and to support development and expanded application of employer-informed skills certification programs as well.

Opportunity-Rich Economy

GO TO 2040's recommendation to develop "career pathways" in collaboration with industry and occupational representatives will make the region's economy more "opportunity-rich" as opportunities for mobility are clarified and relevant information is disseminated. Synthesizing existing local and state-wide work, improving existing pathways and articulating pathways for new industries and occupations will provide the region's workforce with opportunities for ongoing upward mobility and the regional economy with continually increasing levels of productivity.

In aggregate, GO TO 2040's policy recommendations related to human capital development and deployment address one of the most important factors in regional economic growth, and will increase productivity of workers and firms, enhancing attraction and retention of both.

CHAPTER VII: Improving Governance to Support Private-Sector Economic Activity

A. Definition and Significance

One of the most complex challenges in driving regional economic growth is determining how government can enable and improve the performance of the private sector — where wealth is overwhelming created — without displacing or unnecessarily distorting it. Neoclassical economic theory is often used as the rationale for limiting government action to specification of property rights, as further actions are claimed to obstruct efficient market operations. However, if, as North and others believe, effective institutions can play a central role in facilitating economic progress, there is a strong case to be made for improving government (and other institutions) as a strategy for pursuing economic growth.[280]

Through taxes, regulation and provision of public goods (from education to infrastructure), government enables, shapes and uses markets.[281] Government has a very significant — but carefully strategic — role to play both in increasing inputs to the economy (e.g., education increasing human capital) as well as in enhancing its efficiency and productivity (e.g., by providing infrastructure and addressing market imperfections). Playing these roles well entails strategically targeting government activities to the other economic leverage points, as well as improving the efficiency and productivity of government itself.

The range of ways in which government can affect the regional economy is many and varied. The review that follows is limited to addressing three important aspects of government influence on the economy that are emphasized in the GO TO 2040 recommendations:

- Cross-jurisdictional coordination
- Balanced tax policy
- Access to high-quality information

Cross-Jurisdictional Coordination

Among the defining characteristics of America's metropolitan regions is the presence of many units of government — indeed, since 1960, the United States has been creating new governmental entities — general purpose governments, school districts, business improvement districts, park districts, etc. — at the rate of approximately one every 18 days. The country now has over 90,000 distinct governmental entities, the vast majority of them with both administrative powers and taxing authority.[282] The geography of economic activity, however, does not conform to the boundaries of these varied governmental units. Rather, the systems that constitute the regional economy — including housing and labor markets, transportation infrastructure, and others — operate across jurisdictional boundaries. System characteristics in one place (neighborhood, municipality, county, etc.) affect performance throughout the entire region, contributing to or detracting from firms' ability to operate efficiently and productively. The result of a fragmented government environment is inefficient allocation of resources and increased (time and financial) costs of doing business. Furthermore, the mismatch between the political boundaries of local governments and the (often regional) geography of economic activities results in duplication of services, missed economies of scale, collective action problems, difficulty addressing negative externalities (such as pollution or congestion) and increased concentration of poverty.

Local governments in U.S. metropolitan areas come in two basic types, and the proliferation of either kind poses challenges as metropolitan areas become overly fragmented. General-purpose governments (such as municipal or county governments) provide a wide array of services. Horizontal fragmentation describes the presence of multiple non-overlapping governments within a region — consider, for example, how many distinct contiguous municipalities comprise any one of America's metropolitan regions. Special-purpose jurisdictions, by contrast, are created to provide a particular service (e.g., school districts, library districts, water and sewerage districts, fire districts). Vertical fragmentation describes the layering of multiple units of government on top of each other, all serving the same geographic area (or multiple, overlapping areas) — consider, for example, instances in which residents are served by, pay taxes to and vote for leaders of not only their municipal government but also the school district, mass transit district, community college district, water reclamation district, forest preserve district and others. These two kinds of government fragmentation each pose their own challenges to the regional economy, and provide their own opportunities for government coordination to enhance regional economic growth.[283]

There are two schools of thought regarding the impact of horizontal fragmentation on the efficacy and efficiency of government service provision: one contends that a horizontal proliferation of governments creates competitive intergovernmental forces that lead to efficient provision of public goods and services, while a second argues that the presence of externalities causes a horizontally fragmented government environment to be *in*efficient.

The first of these viewpoints, inaugurated in 1956 by economist and geographer Charles Tiebout,[284] argues that governments and citizens are analogous to firms and consumers in a competitive market. Just as in a perfect (theoretical) market competition between firms to sell their products to consumers leads to the optimal allocation of resources in the production of private market goods, the competition between communities for residents is believed to lead to the optimal allocation of resources in the provision of public-sector services.[285] On the demand side, residents (viewed as consumers of public services) reveal their preferences through their decisions on where to live.[286] On the production side, leaders of local governments are motivated to provide services more cost effectively by their job-retention motive (just as the leaders of firms are motivated to produce more cost effectively by their profit motive).[287] This model implies that horizontal fragmentation of local governments will result in highly efficient government service provision because the presence of multiple communities from which to choose creates a competition among governments for residents; allows residents to find a community closely matching their preference set; and reduces the costs of moving between communities.[288]

Tiebout's model has been highly influential, serving as the point of departure for over 1,000 books and articles in economics and political science, and providing the foundation for much of the literature on local public finance.[289] Tiebout himself, however, recognized limitations to his model that have important implications for its practical application. In particular, his model assumes that the market in which communities compete for residents is characterized by an absence of externalities — positive or negative impacts on neighboring communities — whereas in reality "there are obvious external economies and diseconomies between communities… in cases in which the external economies and diseconomies are of sufficient importance, some form of integration may be indicated."[290] As the discussion below reveals, while there are many benefits to intergovernmental competition, there are also substantial costs, which at a minimum suggest the benefits of much greater coordination between local governmental units (and in many instances suggest consolidation).

The literature which casts doubt on the applicability of Tiebout's model focuses on the externalities that arise in the context of intergovernmental competition. Wallace Oates' seminal study on the implications of local governments' competition to attract business investment expresses a concern that competition between governments can lead to inefficiently low tax rates and an under-provision of local services.[291] Many subsequent studies have confirmed his suspicions, identifying instances in which welfare for a single jurisdiction may be optimized while overall regional welfare is reduced (as further detailed in the next section on tax policies).[292] In these models, an increase in one jurisdiction's tax rate benefits its neighbors by making their jurisdictions' comparatively lower tax rates more attractive to businesses seeking to locate in the region. Because the higher-tax-rate government would not benefit from this decision to increase rates, it will likely allow its rates of taxation and its corresponding level of public service provision to remain lower than is optimal.[293] The problem is compounded by the concern that "when all governments behave this way, none gain a competitive advantage, and consequently, communities are all worse off than they would have been"[294] if competition for capital had not influenced their decision making. This literature supports a role for coordination between local governments in a region in order to overcome the detrimental impacts of the intergovernmental competition resulting from horizontal fragmentation.

An example of this problem (which is one of CMAP's taxation policy concerns) is what recent literature calls the "fiscalization of land use."[295] It appears that as local governments receive much-needed revenues from retail sales taxes (particularly where they face constraints on raising revenue from other tax sources, particularly property taxes), it may cause them through zoning, subsidies and other interventions to compete with each other for retail development at the expense of other commercial and industrial development. The argued effect, at a minimum, is that this results in a spatially inefficient distribution of retail across the region.

More generally, other studies have questioned the very premise of the Tiebout model. They argue that treating competition between governments like competition between firms in a functioning market is erroneous, concluding that intergovernmental competition is destructive of the capacity of governments to provide the very goods and services to which they are best suited. That is, if governments are stepping in where markets fail, introducing competition between governments will simply re-create the kind of market failure government initially intervened to address.[296] Coordination across jurisdictions is essential to ensuring governments' ability to effectively and efficiently provide the services to which they are uniquely suited, and which are essential to a well-functioning regional economy.

Furthermore, there are many simpler and more obvious examples of the need for and benefits of local inter-governmental coordination or of consolidating governmental units. Consider, for example, two small neighboring suburbs which each support their own fire departments, though large economies of scale would be created by having one fire department serve both suburbs. Also, many systems — such as highways or public transit — operate across local governmental boundaries in ways which mean that they cannot be efficiently developed and maintained by local governments.

The vertical fragmentation of government in the U.S. — through proliferation of special-purpose districts — is a more recently observed phenomenon than horizontal fragmentation, and one which has consequently received far less attention in academic literature. Growth in special-purpose units of government has been so prolific over the past 50 years that there are now more special-purpose governments than municipal governments, and special-purpose governments, in aggregate, not only spend more combined than all cities in the U.S., but employ more civilian staff than the federal government.[297] This vertical fragmentation leads to severe challenges to the efficient provision of public services.

There are two key characteristics of overlapping special-purpose jurisdictions which lead to an inefficient level of public service delivery. The first is concurrent taxation: multiple independent government units draw on the same tax base to fund their services. The second is selective participation: when governments are dedicated to providing only one service, voters who care more about that service are more likely to participate in elections for the government's leadership than voters who are relatively indifferent.[298] Politicians seeking reelection are therefore guided solely by the preferences of the citizens who vote in their elections. The combination of these two characteristics creates what can be described as a fiscal common pool problem, analogous to common pool problems in resource economics.[299] Special-purpose governments are able to provide the services valued by their respective interest groups with funding from the tax base at large, creating vertical externalities which distort public service provision. While these governments receive taxes from the general citizenry (who are thus paying for services they do not particularly value), they provide benefits targeted to their narrower constituency (who are thus getting services for which they only pay a fraction of the costs). The more layers of governments that are created, the more acute the "overfishing" of the common tax base becomes. In this context, special-purpose jurisdictions will tax and spend more than general-purpose governments when tasked with providing the same service. There is little to no evidence, furthermore, that special-purpose jurisdictions provide higher quality services than general-purpose governments do.[300] Regional coordination and consolidation could help alleviate the fiscal common pool problem created by the vertical layering of single-purpose jurisdictions.

Finally, both horizontal and vertical fragmentation impose administrative burdens on businesses, that add to their costs of production. Each governing body enacts an additional layer of regulatory requirements to which businesses must adhere, often requiring a separate set of procedures and approvals for processes such as business licensing or construction permitting. This adds to the time required to execute day-to-day business activities and contributes to the firms' costs of doing business, negatively affecting their overall performance.

Balanced Tax Policy

Tax policy plays a role in firms' location decisions, as well as their ability to grow and prosper in their chosen locations. Taxes are a cost of production, levied on inputs to production (land, labor, materials, etc.) and often on firms' income, all of which directly affect firm profitability. As such, tax policy is often viewed as a key lever for influencing economic growth, particularly through firm attraction and retention.

There is a vast and continually evolving literature on the impact of taxation on business location decision and economic growth at the local, regional and state level. It has become the prevalent belief in some circles that there is a clear-cut negative relationship between taxation and economic growth: a lower tax burden will increase growth, while a higher tax burden will hinder it.[301] Indeed, microeconomic theory holds that to the extent that taxation creates a deadweight loss[302] in transactions in competitive markets, any increase in taxes will increase said loss, and all else being equal, will impede economic growth. A large segment of the literature, furthermore, has found a statistically meaningful negative correlation between local tax burdens and economic growth when comparing regions' performance to one another (i.e., inter-regional tax differentials and growth patterns).[303] In two influential pieces of work during the early 1990s,[304] Timothy Bartik, for example, finds that among the 57 studies he reviewed, 40 find a statistically significant negative relationship between tax level and business activity.[305] Further studies in the years immediately following Bartik's review revealed similar conclusions.[306]

However, drawing policy conclusions from the results of these studies is not straightforward, as they do not address the positive role that public goods, funded by tax revenue, play in encouraging economic growth. A few studies have begun to explore the impacts of taxation in a more nuanced way, providing evidence that simply lowering taxes, without consideration of the corresponding effect on public service provision, is at least too simple an economic growth strategy — and more likely, wrong — particularly if the goal is to cultivate a high-performing knowledge-based economy. For example, both Bartik's original review and its subsequent update by Wasylenko sound cautionary notes regarding the implications of the literature's findings for policy implementation. While concluding that lowering state and local taxes can significantly increase business activity,[307] Bartik also acknowledges the limitations of his findings: if tax cuts are paid for by cutting public services important to the region's economy, the net impact could be a reduction in economic activity. Wasylenko also raises the issue of flaws in the research design, questioning the extent to which measures of wages, taxes and other factors accurately reflect economic reality.[308] Thus while the tax-effect literature does show a negative relationship between *some measure of the tax level* and economic activity across regions, the models' measurement issues and exclusion of the benefits businesses receive through the deployment of tax dollars into public goods urges caution in interpreting these results to mean that lowering taxes is an effective tool for spurring economic growth.

Further, as a cost of production, taxes generally represent only a small portion of the costs that businesses incur in the normal course of operations. Therefore, the composite tax burden (property, income/revenue and sales combined) is not the primary factor on which business base their location and expansion decisions,[309] particularly when making an inter-regional decision (i.e., among several potential regions).[310] Furthermore, the relative significance of the tax burden as a location decision factor varies by industry, playing a larger role for manufacturing and wholesale firms (which are capital-and land-intensive) as well as retail establishments (whose business is itself the sale of taxable goods), than for headquarters, corporate offices, research and development facilities and service-based establishments.[311] This suggests that using tax levels as a lever for influencing firms' inter-regional location decisions, and consequently economic growth, is unlikely to yield substantial results, particularly if the economic goal is to develop strong knowledge-based sectors and functional concentrations (as discussed in Chapter IV).

The tax-effect literature exhibits less extensive coverage of the impact taxation may have on differences in economic growth *within* regions — i.e., between municipalities within the same region — yet it still offers important insights. The general consensus is that tax effects are larger *within* regions than they are between regions[312] — perhaps four times as large[313] and possibly more significant for industrial activity as it relates to property tax burden in particular.[314] These findings — that tax effects are of a greater magnitude intra-regionally — are somewhat intuitive, given that many of the non-tax factors influencing business selection of a region (e.g., quality of labor force or infrastructure) are available to the business wherever it locates within the selected region, while once it has selected a region, it can pick a local jurisdiction based on tax factors.
From the perspective of metropolitan policy, intra-regional tax effects emphasize the importance of coordinating among the jurisdictions within a region, as discussed in the prior section. If one jurisdiction within a region is able to gain comparative advantage by lowering its tax rates (or offering tax incentives), its neighbors are likely to follow suit, establishing a dynamic of local competition and eliminating the advantage for any.[315] That is, what accrues to the short-term benefit of a single jurisdiction can cause long-term harm to the region as a whole.

More importantly, overall, researchers on tax effects have come to realize that from a policy perspective, taxes are not raised or lowered in a vacuum. There is a meaningful relationship between government tax revenues and public service provision, and the quality of public services impacts regional economic growth.[316] Businesses benefit from the public goods that are funded with local tax revenue — what can be called "productivity amenities"[317] — both through direct impact on business operations and indirectly through other amenities (including ones that help attract necessary human capital). Empirical studies suggest that the most valuable of these include transportation infrastructure, public education and public safety.[318] "High-road regions" invest in these types of productivity-enhancing public goods to add value to the private sector and reduce waste, responding to firms' profit motivation and enabling attraction and retention of high-quality firms.[319] Investing tax revenues in the types of public goods that make businesses most productive will achieve a high net return for tax dollars "invested" and contribute positively to both business performance and the regions' ability to attract and retain firms and workers.

The question of taxation from the perspective of regional policy becomes not whether tax cuts will stimulate economic growth (and if so, how much), but rather how valued governmental services, if tax cuts are implemented, will be funded, or if taxes are raised, how to spend the additional revenue most effectively. Several studies have even found that increasing taxes to fund improved public services has positive net impact on regional economic activity,[320] suggesting that a strategy of raising taxes in order to improve service quality, particularly in areas especially important to the regional economy, could be more effective at influencing economic growth than cutting taxes at the expense of investment in these services.

Access to High-Quality Information

Among the assumptions underlying neoclassical economics models of perfectly competitive markets is the presence of perfect information among market participants: each knows everything there is to know; none knows any more than any other; and actions by market participants do not destabilize this state of perfection. Although economists have long recognized the disconnect between real-life markets and this assumption, it has only been in the last forty years that a rich literature has developed to investigate the impact of information imperfections on market performance. The key insights of this literature are twofold: first, market failure resulting from imperfect information is pervasive; second, these market failures reveal roles that government can play in enhancing economic efficiency.

The role and impact of information imperfections may be most evident in the exchange function of markets: the coming together of buyers and sellers to execute a transaction. Essentially, the quality of information affects the cost of any transaction — the finding and measurement costs for buyers and sellers to locate each other and evaluate risk. Poor information, for example, makes it more expensive for banks to serve consumers without a credit history, or for real estate developers or retailers to find and evaluate opportunities in less developed urban areas.[321] Information imperfections also cause several kinds of more complex market failures.

Incomplete information (each participant does not know all there is to know) can impact the exchange function by allowing the price of goods to rise above the level implied by efficient market behavior. In real-world markets, no single actor knows everything there is to know about the goods being traded in the market,[322] and prices often vary greatly across sellers of the same good. Buyers therefore incur costs to identify the seller with the lowest price. These search costs are not the same for all buyers,[323] meaning that markets will tend to settle at an equilibrium price far above what a competitive market would imply, as buyers with high search costs remain relatively uninformed and buy goods at higher prices, preventing informed buyers (those with low search costs) from driving down prices to competitive equilibrium. Government intervention to reduce search costs can lead to improved efficiency outcomes.[324]

Asymmetric information — the condition of various market participants not possessing information of equal quality — also leads to market inefficiencies.[325] When sellers have better information about the quality of a good than buyers, buyers are compelled to use rule-of-thumb measures to evaluate the quality of a good, causing them to discount their offering prices, often below what a seller is willing to accept for a high-quality good. The result is a lower quality of goods offered for sale; a smaller marketplace; or even the elimination of the functioning market entirely. "Adverse selection" — lower-quality goods driving higher-quality goods out of the market — can, under some conditions, lead to total market failure, whereby no transactions will take place at any price.[326] Government intervention to improve the balance of information between buyers and sellers can help avoid the phenomenon of adverse selection.

While these examples of the impact imperfect information has on economic efficiency are drawn from its role in the exchange function of markets, information also plays a role in the production and consumption functions of markets. In production, better information can improve firm productivity in a variety of ways — for example, by reducing waste in production processes, or by allowing a firm to better track its inventory. In consumption, better information can influence consumer preferences and shift demand. For example, more and better information about the health effects of various foods has caused consumers to make more of their product choices based on the reported nutritional values. In response, food producers have developed healthier products and are marketing them based on their nutritional characteristics. While it is in the exchange function that the effects of imperfect information are most evident, governments attempting to use information to drive economic growth should attend to production and consumption functions as well.[327]

There are many ways in which governments can address the inefficiencies created by imperfect information, and improve economic performance by improving the availability and quality of information for market participants. Government through its other functions is a primary gatherer and repository of the types of information that can help reduce transaction costs and otherwise improve market efficiency. Data on household income, assets and expenditures; on real estate parcels and status; on retail performance in varied geographies; on labor market characteristics; and much, much more is routinely gathered by government, and can be readily made available. A great deal of progress has been made in the last decade on this relatively inexpensive and high-impact role for government.[328]

Better information resources also play a key role in increasing the efficiency of government itself, for planning, implementing and monitoring its activities. Greater transparency in government data (i.e., releasing more information) and more widespread public access to information (including in electronic form) both empowers citizens to make better decisions and drives greater government accountability. Increased government information efficiency also reduces the transaction costs of businesses with government, as well as lowering the costs (and so tax burden) of government.

B. Impacts of GO TO 2040 Recommendations

Applying this understanding of the economics of government coordination, taxation and information to the effects that GO TO 2040 will have on the local government landscape (Chapter I, Characteristic 4), it is evident that the recommendations in GO TO 2040 will improve government's support of private-sector growth. Implementing these recommendations will contribute to the attraction, retention and performance of businesses, leading to growth in the regional economy.

Government Coordination

The seven-county Chicago region is home to 1,226 governmental units — more than any other region in the country.[329] The Chicago region has more general-purpose governments (counties, townships and municipalities) relative to its population than two thirds of the nation's 100 largest metropolitan areas (ranked 67th), and ranks nearly the same when examining the number of special-purpose governments relative to population (ranked 63rd).[330]

The GO TO 2040 recommendations related to increasing the coordination of inter-governmental activities will reduce the negative impacts of the region's extensive horizontal and vertical government fragmentation. The process of developing the GO TO 2040 plan itself is an important first step in building regional consensus and cooperation, and subsequent approval and adoption of the plan by representatives of the region's large and diverse pool of constituent communities will further enhance coordination as it moves the plan another step closer to full implementation. Increased inter-jurisdictional coordination will improve regional efficiency by taking advantage of economies of scale in service provision (and reducing duplication) and reducing the negative externalities that accompany intra-regional competition for funding and investment activity. Further, the plan's recommendations that state and federal programs be more integrated (e.g., combining environment, transportation, housing, education) and that more federal funding streams be targeted to metro areas will further support efforts to focus and coordinate government activities within the region. Better aligning the decision-making processes of the region's many and varied governmental units will increase the productivity and efficiency with which businesses can operate, contributing to regional economic growth.

Moving forward, GO TO 2040's coordination recommendations could be enhanced by focusing on opportunities for coordination on issues other than funding and investment. Further emphasis could be placed on the advantages of inter-jurisdictional cooperation on tax policy and regulations that directly affect the profitability of the region's businesses, which would also reduce local governments' incentives to compete for business investment. Additional attention could also be given to the ways in which coordinated policy and service delivery can address collective action problems, negative externalities (such as pollution or congestion) and increased concentration of poverty. Going further, considering the sheer number of governmental units, much more detailed analysis and political organizing should be undertaken to move beyond coordination to consolidation or elimination.

Tax Policy

The region's multi-faceted tax system — including income, property and sales taxes — is highly complex. There are concerns that the region's tax burden may compromise competition with other regions for businesses and residents,[331] and the processes for levying and distributing revenue may also pose challenges for business efficiency and productivity, and consequently regional economic growth.[332]

The recommendations in GO TO 2040 will foster economic growth by seeking to balance the region's tax policies with the need to provide the public goods most valued by businesses and households. The tax policy recommendations (Chapter I, Characteristic 4) seek to identify ways to streamline the regional tax system and provide a more stable long-term funding stream. Recommendations that encourage increased investment of tax revenue in public goods such as transportation (Chapter I, Characteristic 1), education (Chapter I, Characteristic 3) and protection and provision of open space (Chapter I, Characteristic 5) are directly and well targeted to better tying taxes to the particular public goods that add value to businesses. This high value per tax dollar will support a "high road" economy and contribute to economic growth by aiding in productivity, attraction and retention of businesses and households.

GO TO 2040 tends to focus on taxes as a cost to households to a greater extent than as a cost to firms of doing business. Going forward, greater attention should be paid to addressing the effects that tax policy (including regional collaboration with respect to tax policies) can have on the performance of businesses.

Information Transparency and Sharing

In January 2010, the State of Illinois adopted revised Freedom of Information Act legislation, placing heightened responsibility on public agencies to make their information available to the public.[333] The recommendations in GO TO 2040 will not only respond to this mandate by increasing the amount and quality of information available to government entities, businesses and households (Chapter I, Characteristics 3 and 4), but in doing so will also reduce the costs of economic transactions and increase the efficiency of the regional economy. If more accurate market information is made available, businesses will face lower transaction costs when identifying potential new opportunities and evaluating their anticipated costs, benefits and risks. Data on workforce development programs and information regarding innovation support resources will also be useful to business. Data-sharing among local governments, in particular, will produce benefits of several types. More thorough and timely knowledge of local conditions will enable them to be more strategic in their investment of time and resources for program and policy development, as well as better able to evaluate the results of those initiatives following implementation. Further, broader information sharing will increase transparency of government activities and performance, and ultimately their efficiency.

CMAP's Regional Indicators Project and the recommendations in GO TO 2040 represent a critical and major step toward enhancing the availability of information resources for market development. Two key areas deserve further attention. First, the identification and discussion of information primarily views governments, and to some extent households, as the customers, using the information primarily for planning and tracking activities. It is not tailored to the role and opportunity to provide the types of information resources that will lower transaction costs and expand market activity for businesses. Similarly, the focus is primarily on raw data and simple descriptive tools, without the sophisticated analytic tools that will attract users and enable more efficient markets. Over time, the Regional Indicators Project and the broader data warehouse effort should be expanded to include more online data and decision-making tools that take into account the types of data, analyses and decision tools that are most useful to the private sector.[334] It could also involve using an online platform as a forum for linking local businesses and affiliated organizations to one another for the purpose of information exchange and networking.[335]

Second, related to the other government recommendations as well, as its information activities expand, CMAP should support local governments in moving toward increased online access and transactional capacity with respect to government services and programs. Often referred to as "e-government" or "government 2.0" — including licensing and permitting, submitting service requests, access to social services and so on — this capacity enables the region's businesses and residents to interact more efficiently with the public sector, thus lowering both their transaction costs and the costs of government.

Overall, GO TO 2040's recommendations for greater government coordination, more efficient and high-value-added tax policy and development and provision of better information resources begin to address critical challenges and opportunities in the regional economy, and will move governance, particularly as it affects economic performance, in the right direction. The focus of the recommendations on government efficiency and household cost savings is not matched, however, by a focus on enabling private-sector economic activity. Broadly, implementation would benefit from a more concerted focus on policies and investments that facilitate growth in private-sector economic activity. In addition, expanding the information recommendations to include "government 2.0" and robust analytical market tools could further enhance the impact of this set of recommendations. Finally, it should be acknowledged that the region's local governments have a tendency to act very cautiously in sharing information with one another and their respective constituencies. Given this legacy, CMAP faces a significant challenge in changing the culture of government in order to promote increased transparency and sharing of government information across program silos and geographies.

CHAPTER VIII: Other Economic Impacts

Among the GO TO 2040 recommendations, three other types of impacts of economic significance can be identified: regional resilience, household savings and enhanced amenities.

A. Regional Resilience

An important feature of a regional economy, and the subject of increasing attention and research,[336] is its resilience in the face of challenges. Resilience is defined as the ability of a region to bounce back from an external stress or challenge and recover healthy functionality. Evidence of resilience can be found in the ability of regions and the organizations within them to respond to a challenge by redeploying assets, collaborating within and across the public, private and non-profit sectors and capturing resources from external sources.[337] Resilience does not cause economic growth, in the sense which is the focus of the rest of this report, but it ameliorates economic downturns and provides insurance against economic shocks, and so increasing resilience is valuable to the regional economy.

A growing body of research attempts to identify the characteristics and behaviors that make regions more resilient. For example, one study finds that the most resilient are typically characterized by industry diversity, high levels of innovation and high educational attainment of the workforce. It also notes that participating in the knowledge economy, particularly through attracting high-skilled workers and engaging in innovation, is strongly associated with resilience, in terms of maintaining high wages or reversing a downward trend.[338] A more recent study echoes the importance of industry diversity, innovation and high educational attainment of the workforce, but also finds modern physical infrastructure, strong local governance and a supportive financial system to be important to the resilience of metropolitan areas.[339] Places exhibiting a combination of these characteristics are likely to be more adaptable and quick to recover from economic shocks over the long term than their non-resilient counterparts.

The changes to the economic landscape described in Chapter I, and the economic analysis in the ensuing chapters, make clear that implementation of the GO TO 2040 recommendations will address these factors which substantially increase the resilience of the regional economy. Increasing innovation will make the economy more flexible and adaptive, as will increasing human capital and improving governance. Enhancing diverse clusters will further promote a diverse economy, less subject to shocks in any single sector.

In addition, implementation of the recommendations will make the region more resilient in the face of several specific potential outside shocks. Four types of recommendations in GO TO 2040 will serve to make the region's households and businesses less dependent on scarce resources that are often subject to volatility in supply and pricing, and will make local governments' ability to provide key public goods less vulnerable to the volatility of the macroeconomic business cycle, buffering the region's economy from potential adverse impacts in these areas in the future.

(i) **Strategically Improve Transportation Infrastructure**
Decreased reliance on surface travel via private automobiles and freight-bearing trucks will make the region more resilient to potential fluctuations in the price of petroleum in the future. Improvements to the region's roadways, freight rail and public transit systems, together with recommendations that discourage peak-time driving (see Chapter V), will decrease the number of vehicle-miles traveled on the region's roadways, and consequently, the amount of petroleum-based fuel consumed by households and businesses. Therefore, any future increases in the price of petroleum will have a less significant impact on the region than they would have in the absence of these recommendations.

(ii) **Water and Energy Conservation**
Within the group of GO TO 2040 recommendations aimed at improving the regional quality of life (Chapter I, Characteristic 5), the conservation and retrofitting recommendation, by lowering rates of energy and water consumption, will make the region's economy more resilient to potential future shocks to the supply of those resources. Water supplies are most vulnerable to natural phenomena such as drought, while energy supplies are at risk of both weather-related events and broader global circumstances in trade and natural resource pricing that could lead to short- or long-term rises in energy prices. The more conservatively the region's businesses and households use water and energy resources, the less severe the impact of future changes in water or energy pricing will be for the region's economy.

(iii) **Support of Local Food Systems**
GO TO 2040 recommends improving local food production and distribution (Chapter I, Characteristic 5). Supporting local food systems makes the region more resilient in four ways: (i) by reducing the long journeys taken by food and so the impact of future rises in fuel prices;[340] (ii) by reducing exposure to significant disruptions in any one of the small number of firms that dominate the industrial food economy;[341] (iii) by increasing agrobiological diversity that makes crops less vulnerable to diseases; and (iv) by reducing vulnerability to both accidental and deliberate (e.g., bioterrorism) contamination through decentralization of production and processing.[342]

(iv) **Reform State and Local Tax Policy**
GO TO 2040's recommendation to explore state and local tax policy reforms (Chapter I, Characteristic 4) suggests a goal of reducing local governments' reliance on sales tax revenue. Because Illinois sales tax revenue is allocated to the jurisdiction in which the sale occurs, local budgets are directly linked to the performance of the retail sector.[343] Because sales are dependent on consumers' willingness to spend, retailers are typically among the hardest hit during economic downturns,[344] causing many economists to view sales tax as one of the most volatile revenue instruments — compared to income and property taxes.[345] The revenue swings associated with sales tax collections are ultimately manifested in municipalities' budgets: relying heavily on unstable sales tax revenue can compromise the ability of local governments to provide public goods such as infrastructure and schools and support growth-oriented policies such as job creation.[346] Reducing local governments' dependence on sales tax revenue to fund public goods and services will make the region's municipalities more resilient in the face of future economic downturns.

B. Household Cost Savings

Two types of GO TO 2040 recommendations will benefit the region's residents by lowering the costs of basic household expenditures. These savings can be reallocated to more productive uses such as obtaining additional skills and education (to increase productivity and wages), starting a new business or other local consumption and investment activities that may better benefit the regional economy.

(i) **Strategically Improve Transportation Infrastructure and Facilitate a More Compact Development Pattern**
Recommendations affecting the region's transportation infrastructure and built environment (Chapter I, Characteristics 1 and 2) will lower transportation costs for households through a combination of shorter trip distances and reduced travel times due to lower per capita congestion. Households will have additional disposable income that can be reinvested elsewhere in the regional economy.

(ii) **Water and Energy Conservation**
The GO TO 2040 recommendation that encourages water- and energy-efficiency retrofits (Chapter I, Characteristic 5) will lower household expenditures by reducing consumption of both resources, leading to household cost savings. If the residential retrofitting goals outlined by the Chicago Climate Action Plan are achieved, the cost savings could amount to an average of as much as $544 annually per household.[347]

While there is no guarantee that household savings will be redirected into productive economic activity, both of these impacts are likely to strengthen the regional economy.

C. Enhanced Quality-of-Life Amenities

Several GO TO 2040 recommendations will improve residents' quality of life through improved livability — attention to community character, aesthetics, accessibility and environmental sustainability — and enhancement of various public goods amenities (Chapter I, Characteristics 1, 2 and 5). While the most important factor in attracting and retaining skilled workers is the quality of employment opportunities, quality of life and amenities also play a significant role, in the attraction of firms as well. Tolley et al, for example, find support for the notion that individual's "sense of place" — including both physical and cultural amenities such as attributes of infrastructure and social networking opportunities — play a role in influencing labor supply and regional economic growth.[348] Among CMAP's recommendations, four will serve to make the region's communities more livable, thereby indirectly influencing economic growth.

(i) **Achieve Greater Livability Through Land Use and Housing**
The recommendation to promote mixed-income, mixed-use transit-accessible communities (Chapter I, Characteristic 2) will help the region attract and retain knowledge economy workers. The convenience factor of these communities — proximity to employment, schools, retail and services, entertainment and a range of transportation options — makes them highly desirable, as demonstrated by households' greater willingness to pay to live in such communities.[349] Walkable communities, and transit-oriented development in particular, also help to retain workers through growth in property values over time,[350] a trend that is expected to continue into the future as real estate values over the next 25 years are predicted to rise most quickly in "smart communities" that incorporate a mix of residential and commercial districts in a "pedestrian friendly configuration."[351]

(ii) **Manage and Conserve Water and Energy Resources**
GO TO 2040's recommendation to embrace water conservation and energy efficiency (Chapter I, Characteristic 5) will also serve to increase the region's attractiveness to knowledge economy workers. "Green" neighborhoods, in which infrastructure, policy and incentives foster efficient resource utilization, are highly desirable places in which to live, in part because of the lower utility costs faced by consumers (see B(ii), above). Local governments that mandate green residential features may therefore be directly contributing to consumer cost savings — and indirectly, regional economic growth.

(iii) **Expand and Improve Parks and Open Space**
The GO TO 2040 recommendation to enhance the region's network of parks and open space (Chapter I, Characteristic 5) will make the region more attractive to new workers as well as enhance the quality of life of current residents. Aside from environmental and health benefits, parks, open space and natural features are among the most attractive amenities in Northeastern Illinois. An early study on the relationship between amenities and urban land prices determined that proximity to Lake Michigan — and its surrounding recreational open space — was a highly desired characteristic of Chicago homes. Accordingly, the value of living one mile closer to the Lake was estimated to be $2,219 on a capitalized basis.[352] After improvements to Chicago's Garfield Park were made in 1997, the number of "casual" visitors to the park the following year nearly doubled — from 15,000 to 40,000.[353] Studies of the value placed on parks and open space in other metropolitan areas have echoed these findings.[354]

(iv) **Promote Sustainable Local Food**
The recommendation to support and promote a sustainable, local food system (Chapter I, Characteristic 5) will add to the region's ability to attract and retain households and workers. In addition to the health and environmental benefits, sustainable food systems increase community food security — an attractive neighborhood feature. By maintaining local control over the availability and distribution of food, sustainable food systems will likely buffer the region against periods of economic insecurity that may disrupt normal food flows.[355] Research indicates that tighter-knit communities often develop as a byproduct of increased local food control: relying less on distant agricultural sources solidifies interregional dynamics between producers and consumers, thereby increasing community trust and participation.[356]

Conclusion

The increasing dynamism which characterizes the global economy means that the economic prosperity that the nation and the Chicago region have long enjoyed cannot be taken for granted. The greater role of knowledge in all aspects of the economy, and its distinct characteristic of generating increasing returns, mean that economies are diverging. Places that gain and nurture a competitive advantage will thrive, while those that remain passive will stagnate and be left behind. This is particularly important for regional economies, as regions have become the key unit of economic geography in which these dynamics play out. Given this context, it is more important than ever to act strategically and deliberately to foster economic growth at the regional level.

Regions that succeed in guiding economic growth develop a deep, ongoing capacity to approach their economy as a multi-faceted system that is more than the sum of its parts. They profoundly, carefully and continually understand and engage to enhance the performance of the complex, organic, market mechanisms through which millions of individuals and firms interact to produce economic growth. They are adaptive and nimble, able to adjust quickly to changes in the macro or local economic environment. They take an integrated approach to economic growth, bridging across traditional silos of policy and programmatic activity and, even more importantly, across the activities of the public, private and civic sectors. Cross-fertilization is facilitated across industries, occupations and functions in the private sector, providing rich opportunities for idea exchange and innovative collaborations. The culture in economically successful regions is inclusive and open, availing itself of new ideas, people and approaches. Highly networked, flexible and adaptive institutional infrastructure has become increasingly important to sustained growth and development.

In this context, the Chicago region finds itself at an economic crossroads. On the one hand, the current status of the regional economy is strong. The region successfully made the turn, in the ‘80s and ‘90s, from a primarily industrial economy to a knowledge- and service-based economy. It has high levels of human capital, with strong concentrations in information sector industries and knowledge based functional clusters — a headquarters region with thriving finance, business services, law, IT and emerging bioscience, advanced manufacturing and similar high growth activities. It combines multiple deep areas of specialization, providing the resilience that comes from economic diversity. It is home to the abundant quality-of-life amenities that flow from business and household prosperity. It is truly a global region with an economy that leads in global competition.

On the other hand, beneath this static portrait of our strengths lie some disturbing signs of potential loss of momentum. Trends in the last decade reveal slowing rates, compared to other regions, of growth in productivity and gross metropolitan product. Current levels of innovation, new firm creation, business churn and adaptation and employment are comparably poor. The region also faces emerging challenges with respect to both spatial efficiency and the governmental environment.[357]

In short, the Chicago regional economy has enormous assets on which to continue building, but we need to pay attention in order to guarantee continued growth and prosperity. To seize this moment, it is critical to develop the institutional infrastructure which provides the capacity to be deliberate and strategic, enhances flexibility and adaptability and fosters open, formal and informal networks, especially coordination between the private, public and civic sectors. GO TO 2040 provides a critical roadmap toward continued economic growth. As importantly, the process of creating, and now of implementing, the plan itself contributes to enhancing this key institutional capacity. Much more work needs to be done, but GO TO 2040 places the region firmly on the right path and — given the region’s enormous economic capacity and potential — shows great promise for success.

Endnotes

1 Full text of the plan can be found online at http://www.cmap.illinois.gov/2040/download-the-full-plan.

2 CMAP was created by the Regional Planning Act (House Bill 3121), which was subsequently amended in 2007. See 70 ILCS 1707/45 (Public Act 95-677), available at http://www.loislaw.com/livepublish8923/doclink.htp?dockey=20897488@ILACTS&alias=ILACTS&cite=95-677.

3 As a result, the policies included in the plan primarily for social, environmental or other equally important — but non-economic — reasons, are addressed only lightly, if at all, in this economic assessment, and then only with respect to their economic impact. The plan itself should be referenced to understand the full scope of these policies.

4 The plan also recommends *further exploration* of parking management strategies (including, but not limited to, pricing), a long-term replacement for the motor fuel tax (potentially based on vehicle miles traveled), use of "value capture" strategies (e.g., development impact fees) and pursuit of public-private partnerships to design, build, operate and/or maintain infrastructure, as appropriate.

5 The plan anticipates regional population growth of 2 million, so its recommendations affecting traffic congestion will not reduce congestion absolutely (compared to today), but instead result in much better congestion management, and reduction of congestion per capita.

6 The recommendations in Chapter 6 (Increase Commitment to Public Transit) overlap with this recommendation, by urging investment in transit-supportive land use and infrastructure.

7 Within these over-arching recommendations, specific implementing actions include reinstatement and/or increased funding for current and former programs to foster innovation, commercialization and entrepreneurship, including the Illinois Entrepreneurship Network (IEN) which provides assistance with business plan development as well as access to capital, technology and networks; the Illinois Innovation Challenge Match Grant program to provide matching funds to recipients of federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) awards; and Illinois Technology Enterprise Centers (ITEC) program to bridge the financial and technical assistance gap between (often academic) research and its commercial application.

8 A third recommendation, outlined in the chapter "Promote Sustainable Local Food," may also have an impact on the region's economy, though its inclusion in the plan is for primarily non-economic reasons. Implementation of the chapter's recommendations could result in growth of food-related jobs and firms.

9 While the freight and logistics and energy-efficiency goods and services clusters are highlighted to some degree in GO TO 2040's recommendations, they are only two of a much broader set of regional clusters that CMAP has identified and which its policy recommendations support. For an early-stage analysis of the region's existing and emerging clusters, see *Industry Clusters: CMAP Regional Snapshot* (Chicago: CMAP, 2009) and CMAP, *Industry Cluster Analysis: Regional Economic Base Analysis* (Chicago: CMAP, June 2009).

10 The urbanized population of the world in 2050 is projected to be equivalent to the total population of the world as of 2004. *World Urbanization Prospects: The 2009 Revision Highlights* (New York and Geneva: UN Division of Economic and Social Affairs Population Division, March 2010), 4.

11 *The State of Metropolitan America: On the Front Lines of Demographic Transformation* (Washington, DC: The Brookings Institution Metropolitan Policy Program, 2010), 16. Figure reflects Brookings analysis of Census Bureau Population Estimates Program data for 2009.

12 Research universities figure from unpublished analysis of 2008 data from the Carnegie Foundation for the Advancement of Teaching by The Brookings Institution Metropolitan Policy Program. Figures for air passengers and public transit passenger miles are for 2005, as cited in Alan Berube, *Metro Nation: How U.S. Metropolitan Areas Fuel American Prosperity* (Washington, DC: The Brookings Institution Metropolitan Policy Program, 2007), 32.

13 See, Brookings, *The State of Metropolitan America*, 38 and UN Population Division, *World Urbanization Prospects: The 2009 Revision Highlights*.

14 Brookings, *The State of Metropolitan America*, 17.

15 Unpublished analysis of 2008 data from the Bureau of Economic Analysis by The Brookings Institution Metropolitan Policy Program.

16 These areas are home to 68% of jobs, 74% of both 4-year and graduate degree holders, 79% of knowledge jobs, 78% of patents, 80% of NIH/NSF funding and 94% of venture capital investments. Figures are for 2008 with the exception of patents, NIH/NSF funding and venture capital investment, and are based on analysis by The Brookings Institution Metropolitan Policy Program and Berube, *Metro Nation*, 32.

17 Mark Muro, Bruce Katz, Sarah Rahman and David Warren, *MetroPolicy: Shaping a New Federal Partnership for a Metropolitan Nation* (Washington, DC: The Brookings Institution Metropolitan Policy Program, 2008).

18 See, generally Gordon L. Clark, Maryann P. Feldman and Meric S. Gertler, Eds., *The Oxford Handbook of Economic Geography* (Oxford: Oxford University Press, 2000).

19 Edward L. Glaeser, "Are Cities Dying?" *The Journal of Economic Perspectives* 12(2) (Spring 1998): 140.

20 Alfred Marshall, *Principles of Economics* (London: Macmillan and Co, 1890).

21 See, generally, Edward Glaeser, ed., *Agglomeration Economies (National Bureau of Economic Research Conference Report)* (Chicago: University of Chicago Press, 2010).

22 Note that CMAP's jurisdiction and composition largely encompass the metropolitan area, but may not encompass the entire economic region (which might include, for example, Milwaukee and Gary).

23 It is argued that, in the context of the globalized economy, regions are big enough to compete internationally, but still small enough to benefit from network and agglomeration economies. Regions may offer a minimum size at which markets and business networks achieve the economies of scale necessary to compete in international markets. Yet regions are small enough to provide the geographic proximity of firms which fosters the benefits of agglomeration economies. See, e.g., Annalee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, MA: Harvard University Press, 1994); Manuel Pastor Jr. et al., *Regions That Work: How Cities and Suburbs Can Grow Together* (Minneapolis, MN: University of Minnesota Press, 2000); Pierre-Paul Proulx, "Cities, Regions, and Economic Integration in North America," in *North American Linkages: Opportunities and Challenges for Canada*, ed. Richard Harris (Calgary: University of Calgary Press, 2003); and Peter Calthorpe and William Fulton, *The Regional City* (Washington, DC: Island Press, 2001), 17-21.

24 As mentioned in the preface, the analysis underlying identification of these leverage points was carried out in conjunction with the Brookings Institution Metropolitan Policy Program, as well as with the George Washington University Institute of Public Policy, in connection with related projects. Note that these leverage points are not intended to encompass everything of importance to regional economic growth, but rather to focus on the most important points of intervention affected by the GO TO 2040 plan. Further, for the purpose of this paper, discussion of the scope of each leverage point has been narrowed to reflect only those aspects that the GO TO 2040 policy recommendations will influence.

25 G.M. Grossman, and E. Helpman, *Innovation and Growth in the Global Economy* (Cambridge: MIT Press, 1991); Joseph Schumpeter, *Capitalism, Socialism, and Democracy* (New York: Harper Brothers, 1947); Paul M. Romer, "Increasing Returns and Long Run Growth," *Journal of Political Economy* 94(5) (1986): 1002-1037; Robert Atkinson and D. Audretsch, *Economic Doctrines and Policy Differences: Has the Washington Policy Debate Been Asking the Wrong Questions?* (Washington, DC: Information Technology and Innovation Foundation, 2008).

26 Marshall, *Principles of Economics*; J. Vernon Henderson, "Marshall's Scale Economies," Journal of Urban Economics 53(1) (2003): 1-28; Gilles Duranton and Diego Puga, "From Sectoral to Functional Urban Specialization" (NBER Working Paper 9112, 2002); Michael Porter, *Competitive Advantage: Creating and Sustaining Superior Performance* (New York: Free Press, 1998). For a general review, see, Joseph Cortright, *Making Sense of Clusters: Regional Competitiveness and Economic Development* (Washington, DC: The Brookings Institution, March 2006). On agglomeration economies, see Edward Glaeser, ed., *Agglomeration Economies*.

27 See, for example, Jackie Cutsinger et al., "Verifying the Multi-Dimensional Nature of Metropolitan Land Use: Advancing the Understanding and Measurement of Sprawl," *Journal of Urban Affairs* 27(3):235-259; William T. Bogart, Don't Call it Sprawl (Cambridge: Cambridge University Press, 2006); and Keith R. Ihlanfeldt, "The Geography of Economic and Social Opportunity in Metropolitan Areas" in *Governance and Opportunity in Metropolitan America*, ed. A. Altshuler, W. Morrill, H. Wolman, and F. Mitchell (Washington, DC: National Academy Press, 1999), 213-252.

28 Christopher Berry, Riccardo Bodini and Robert Weissbourd, *Grads and Fads: The Dynamics of Human Capital Location*, (Chicago: CEOs for Cities, August 2005). For a review of the literature, see Paul D. Gottlieb and Michael Fogarty, "Educational Attainment and Metropolitan Growth," *Economic Development Quarterly* 17(4) (2003): 325-336. See also, Edward Denison, *Trends in American Economic Growth, 1929-82* (Washington, DC: The Brookings Institution, 1985); Paul Romer, "Endogenous Technological Change," The Journal of Political Economy 98(5) (October 1990): S71-S102; Vijay Mathur, "Human Capital-Based Strategy for Regional Economic Development," *Economic Development Quarterly* 13(3) (August, 1999): 203-216; Edward Glaeser and Janet Kohlhase, "Cities, Regions and the Decline of Transport Costs" (Discussion Paper 2014, Harvard Institute of Economic Research, July 2003).

29 See, Douglas North, *Institutions, Institutional Change, and Economic Performance* (Cambridge: Cambridge University Press, 1990); Richard Nelson, ed., *The Limits of Market Organization* (New York: Russell Sage Foundation, 2005); Christopher Berry, *Imperfect Union: Representation and Taxation in Multilevel Governments* (Cambridge: Cambridge University Press, 2009); Robert Weissbourd, *Into the Economic Mainstream: A Discussion Paper on Bipartisan Policies for Inclusive Economic Growth* (Philadelphia and Washington, DC: Opportunity Finance Network and CFED, August 2006).

30 "Knowledge economy" refers here to the increasing importance of information and knowledge resources (a) as inputs to production, (b) in the production and market process and (c) as products and services. See discussion in Robert Weissbourd and Christopher Berry, *The Changing Dynamics of Urban America* (Chicago: CEOs for Cities, 2004), 24-27; Matthew Drennan, *The Information Economy and American Cities* (Baltimore: Johns Hopkins University Press, 2002); and J. Houghton and P. Sheehan, *A Primer on the Knowledge Economy* (Melbourne City, Australia: Center for Strategic Economic Studies, Victoria University, 2000).

31 Weissbourd and Berry, *The Changing Dynamics of Urban America*, 24-36; 79-82.

32 Though our definition includes the effect (increased productivity and efficiency of firms) in the definition, it is important for practitioners to distinguish the question of how to increase innovation from the question of what innovations to increase (i.e., which will make the most difference in a particular local economy). From this perspective, not all innovations are equally good, or even good at all: making a more efficient horse and buggy may not be the most promising economic development strategy. In fact, most mutations fail. This definition and the example linear model that follows are derived from: "Innovation Measurement: Tracking the State of Innovation in the American Economy," Report to the Secretary of Commerce by the Advisory Committee on Measuring Innovation in the 21st Century Economy; "Crossing the Next Regional Frontier: Information and Analytics Linking Regional Competitiveness to Investment in a Knowledge-Based Economy," research conducted for the Economic Development Administration, October 2009; Between Invention and Innovation: An Analysis of Funding for Early-Stage Technology Development (Gaithersburg, MD: Economic Assessment Office, Advanced Technology Program, National Institute of Standards and Technology, November 2002); Berube "*Metro Nation*"; Christine Greenhalgh and Mark Rogers, *Innovation, Intellectual Property, and Economic Growth* (Princeton: Princeton University Press, 2010). While the stages of the innovation process are listed here in a largely linear fashion, in reality they do not follow a direct path from the beginning to the end of the chain depicted above. An activity need not include all of the stages articulated in the chain in order to be considered "innovative." For example, manufacturing process improvements are not generally derived from basic research, nor is an existing business's new product launch dependent on entrepreneurship. Further, the process is often iterative, particularly in the earlier stages of discovery, problem solving and solution testing, as highlighted by the interview findings cited in *Between Invention and Innovation: An Analysis of Funding for Early-Stage Technology Development*, (34).

33 Philip Cook and Olga Memedovic, *Strategies for Regional Innovation Systems: Learning Transfer and Applications* (Vienna: United Nations Industrial Development Organization, 2003), 4.

34 For example, multiple new product and/or process ideas might be generated during the invention stage, leading to separate innovation paths for each; unsuccessful proof-of-concept testing may send innovators back to the idea generation stage; or market introduction might bring to light a shortcoming of the technology that returns innovators back to the applied R&D stage for additional development. See, e.g., the interview findings highlighted in *Between Invention and Innovation: An Analysis of Funding for Early-Stage Technology Development*, (34).

35 *Innovation Measurement: Tracking the State of Innovation in the American Economy* (Washington, DC: U.S. Department of Commerce, The Advisory Committee on Measuring Innovation in the 21st Century Economy, January 2008), xii.

36 Entrepreneurship is a distinct, but closely related, subject to innovation. Not all entrepreneurs are innovators, and not all innovations enter the economy through new firms (i.e., through entrepreneurs), but entrepreneurs are a key source of translating new ideas and products to businesses. Schumpeter, for example, pointed out long ago that the most drastic innovations are often brought to market by new firms, noting that the firms that built the first railroads were not the same ones that had previously operated the stagecoaches. Joseph Schumpeter, *The Theory of Economic Development* (Oxford: Oxford University Press, 1934), as cited in Joseph Cortright, "New Growth Theory, Technology and Learning: A Practitioners Guide," U.S. Economic Development Administration Reviews of Economic Development Literature and Practice, No. 4, 2001, 14.

37 See, for example, Tom Kelley, *The Art of Innovation: Lesson in Creativity from IDEO, America's Leading Design Firm* (New York: Doubleday, 2001); Andrew Hargadon, *How Breakthroughs Happen: The Surprising Truth About How Companies Innovate* (Boston: Harvard Business School Publishing, 2003); Peter F. Drucker, *Innovation and Entrepreneurship* (New York: Harper & Row, 1985); and Kim S. Cameron and Robert E. Quinn, *Diagnosing and Changing Organizational Culture: Based on the Competing values Framework* (San Francisco, CA: Jossey-Bass, 2006).

38 "The regional innovation system can be thought of as the institutional infrastructure supporting innovation within the production structure of a region." Bjørn T. Asheim and Meric S. Gertler, "The Geography of Innovation: Regional Innovation Systems," in *The Oxford Handbook of Innovation*, Fagerberg, Mowery and Nelson, Eds., 299; see also, Zoltan Acs, *Innovation and the Growth of Cities*, (Cheltenham, UK: Edward Elgar Publishing Limited, 2002), 183; Beat Hotz-Hart, "Innovation Networks, Regions, and Globalization," in *The Oxford Handbook of Economic Geography*, 432-450.

39 Note that, in the shorter term, growth can also occur through increasing economic inputs or importing someone else's innovations. See Paul Romer, "Two Strategies for Economic Development: Using Ideas and Producing Ideas," Proceedings of the World Bank Annual Conference on Development Economics, 1992. See, generally, Romer, "Endogenous Technological Change"; Grossman and Helpman, *Innovation and Growth in the Global Economy*; and Schumpeter, *Capitalism, Socialism, and Democracy*. For a review of empirical studies confirming the relationship between innovation and regional economic growth, see, Jeremy Howells, "Innovation and Regional Economic Development: A Matter of Perspective?" *Research Policy* 34(8) (2005): 1222-1223.

40 Classical and neoclassical economic theories generally view the level of technology (often used interchangeably with "innovation") as exogenous — beyond the influence of local economic actors — and focus on the roles of physical and human capital in driving growth. See discussion in Atkinson and Audretsch, *Economic Doctrines and Policy Differences: has the Washington Policy Debate Been Asking the Wrong Questions?* New growth theory has its roots in the work of Paul Romer, who first explicitly incorporated technological change as a factor subject to deliberate influence (endogenous factor) in economic growth models – in fact the primary driving factor. See Romer, "Endogenous Technological Change." For an overview of new growth theory, see, generally, Joseph Cortright, "New Growth Theory, Technology and Learning: A Practitioners Guide."

41 Weissbourd and Berry, *The Changing Dynamics of Urban America*, 22-23.

42 See, Paul M. Romer, "Implementing A National Technology Strategy with Self-Organizing Industry Boards," *Brookings Papers on Economic Activity, Microeconomics* 2 (1993); Charles Jones, "Sources of U.S. Economic Growth in a World of Ideas," *American Economic Review* 92(1) (2002): 220-239; and *A Strategy for American Innovation: Driving Towards Sustainable Growth And Quality Jobs* (Washington, DC: Executive Office of the President, 2009).

43 On global innovation competition, see *Competitiveness Index: Where America Stands* (Washington, DC: Council on Competitiveness, 2007). See also, *The Atlantic Century*, (Washington, DC: Information Technology and Innovation Foundation, 2009).

44 Several knowledgeable observers have suggested that the "next economy," emerging in the wake of the Great Recession, will be more export-led, lower carbon and *innovation-fueled*. See, e.g., Lawrence H. Summers, "Rescuing and Rebuilding the U.S. Economy: A Progress Report," remarks at the Peterson Institute for International Economics. July 17, 2009; "Remarks by the President in the State of the Union Address," Washington, DC, January 27, 2010; Bruce Katz, "The Next Economy: Transforming Energy and Infrastructure Investment," conference presentation, East Palo Alto California, February 2-3, 2010; and "Strengthening the American Labor Force" in *The Economic Report of the President* (Washington, DC: U.S. Government Printing Office, February 2010).

45 The process of replacing existing goods, services, processes and business models with new, especially revolutionary, ones is what drives economic growth over the long term. New methods, enterprises and markets are created, causing others to become obsolete and cease to be made, used or engaged in. See Joseph Schumpeter, *Capitalism, Socialism, and Democracy*, 82-85.

46 See, e.g., See, Abbie Griffin, "Product Development Cycle Time for Business-to-Business Products," *Industrial Marketing Management* 31(4) (2002): 291-304; Manyika, Lund and Auguste, "From the Ashes: The Most Dynamic Economies Rely on Creative Destruction to Grow," *Newsweek* (August 16, 2010); Jean-Paul Rodrigue, Claude Comtois and Brian Slack, *The Geography of Transport Systems* (New York: Routledge, 2009); Henry Chesbrough, *Open Business Models: How to Thrive in the New Innovation Landscape* (Boston: Harvard Business School Press, 2006); and Sawers, Schydlowsky and Nickerson, Eds., *Emerging Financial Markets in the Global Economy* (River Edge, NJ: World Scientific Publishing, 2000).

47 See, e.g., Acs, *Innovation and the Growth of Cities*, 183; Beat Hotz-Hart, "Innovation Networks, Regions, and Globalization," in *The Oxford Handbook of Economic Geography*, 432-450.

48 Atkinson and Audretsch, *Economic Doctrines and Policy Differences: has the Washington Policy Debate Been Asking the Wrong Questions?*

49 See, e.g., Greg Tassey, *Rationales and Mechanisms for Revitalizing U.S. Manufacturing R&D Strategies* (Washington, DC: National Institute of Standards and Technology, 2009); *A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs* (U.S. Office of Science and Technology Policy).

50 Perhaps the one of these which most bears further comment (beyond what's in other chapters) more specifically tailored to innovation is the institutional environment. It's clear, in particular, that rich formal and informal networks of workers, firms, research institutions, investors and others play a key role in fostering innovation. Indeed, in addition to focusing on specific inputs (such as human capital or finance) and conditions (such as strong clusters or open government), the main foundational activity available at the regional level is to focus on building an "innovation ecosystem," which largely consists of building the institutions and connections that enable knowledge to flow and transactions to more readily occur. Rationales for developing a strong regional innovation ecosystem (or regional innovation system) include that they can enable regions to leverage "sticky" local knowledge to increase competitive advantage and capitalize on the output of local knowledge-creating organizations (universities and others). Asheim and Gertler, "The Geography of Innovation: Regional Innovation Systems" in *The Oxford Handbook of Innovation*, especially 298-300. See also the discussion of the components, functions and relationships encompassed by systems of innovation in Charles Edquist, "Systems of Innovation: Perspective and Challenges" in T*he Oxford Handbook of Innovation*, 188-198. See also, generally, Philip Cooke, "Regional Innovation Systems, Clusters, and the Knowledge Economy," *Industrial and Corporate Change* 10(4) (November 4, 2001): 945-974; David Doloreux and Saeed Parto, "Regional Innovation Systems: A Critical Synthesis," Discussion Paper Series, United Nations University Institute for New Technologies, August 2004; and Philip Cooke et al, "Regional Innovation Systems: Institutional and Organizational Dimensions," *Research Policy* 26 (1997): 475-491.

51 For example, basic and applied research interventions might include creation of research centers and incentives for private sector R&D. Commercialization of knowledge might be enhanced by strengthening technology transfer and related programs that create the networks, incentives and expertise to move the ideas from the lab to the marketplace. Entrepreneurship and firm growth might be supported through combined technical assistance and finance programs that act through customer, peer and market-driven networks that include experienced mentors, investors and institutional partners.

52 See, e.g., Joseph Cortright and Heike Mayer, *Signs of Life: The Growth of Biotechnology Centers in the U.S.* (Washington, DC: The Brookings Institution Center on Urban and Metropolitan Policy, January 2001). For a particularly successful and prominent example of practice, see JumpStart, http://www.jumpstartinc.org/, which bundles an array of products and services to support innovation related entrepreneurship.

53 See, e.g., Randall Eberts, George Erickcek and Jack Kleinhenz, "Dashboard Indicators for the Northeast Ohio Economy: Prepared for the Fund for Our Economic Future," Working Paper #06-05, Federal Reserve Bank of Cleveland, 2006, 12; *Regions Matter: Economic Recovery, Innovation and Sustainable Growth* (Paris: Organisation for Economic Co-operation and Development (OECD), 2009), 44-45.

54 Among the 50 largest U.S. metropolitan areas, the number of science and engineering PhDs granted has a positive and significant effect on levels of innovation commercialization, as defined by Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) grants, venture capital investments or initial public offerings (IPOs). Joshua L. Rosenbloom, "The Geography of Innovation Commercialization in the United States during the 1990s," The University of Kansas Working Papers Series in Theoretical and Applied Economics, Working Paper Number 200502, 2004 (subsequently published under the same title in *Economic Development Quarterly* 21(1) (2007): 3-16).

55 "[W]hat triggers the search for and exploitation of opportunities by some individuals but not others" is a set of "skills, aptitudes, insight and circumstances that is not either uniformly or widely distributed in the population," including their perceptions of risk and their ability to deal with and manage that risk. See, Acs, *Innovation and the Growth of Cities*, 13.

56 See, Gottlieb and Fogarty, "Educational Attainment and Metropolitan Growth," 9.

57 Dominic Power and Mats Lundmark, "Working Through Knowledge Pools: Labour Market Dynamics, the Transference of Knowledge and Ideas, and Industrial Clusters," *Urban Studies* 41 (May 2004): 1025-1044.

58 Mature, capital-intensive industries tend to rely on within-industry spillovers, while higher-tech industries often also benefit from spillovers from outside of their immediate industry grouping. Vernon Henderson, Ari Kuncoro and Matt Turner, "Industrial Development in Cities," *The Journal of Political Economy* 103(5) (October 1995): 1067-1090; Bjørn Asheim, Ron Boschma and Philip Cooke, "Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases," Papers in Evolutionary Economic Geography, #07.09, Utrecht University, Section of Economic Geography, revised Nov 2007.

59 See discussion immediately below of the importance of the institutional environment to innovation. In Chicago, the Mayor's Council of Technology Advisors provides such a monthly forum.

60 See, e.g., Mikel Landabaso and Benedicte Mouton, "Towards a New Regional Innovation Policy: 8 Years of European Experience Through Innovative Actions," draft for publication, European Commission Directorate-General for Regional Policy, 2002, 9-12 (section 1.3, New Instruments).

61 De Gregorio and Shane find that the varying rate of new firm formation across universities is partially explained by both university eminence and university policies such as making equity investments in licensed start-ups and maintaining a low share of royalties. Dante Di Gregorio and Scott Shane, "Why do Some Universities Generate More Start-ups than Others?" *Research Policy* 32(2) (2003): 222. For a review of a range of micro- and macro-level factors influencing new firm creation via university technology-licensing offices, see 210-214.

62 See, e.g., David Audretsch and Max Keilbach, "Entrepreneurship Capital and Economic Performance," Discussion Papers on Entrepreneurship, Growth and Public Policy #0104, Max Planck Gesellschaft, 2004, 5; Christie Baxter and Peter Tyler, "Facilitating Enterprising Places: the Role of Intermediaries in the United States and United Kingdom," in *The Economic Geography of Innovation*, ed. Karen R. Polenske (Cambridge: Cambridge University Press, 2007), 261-288.

63 Philip Cooke, Mikel Gomez Uranga and Goio Etxebarria, "Regional Innovation Systems: Institutional and Organisational Dimensions," *Research Policy* 26 (1997): 488, including citations of G. Sweeney, "National innovation policy or a regional innovation culture," Working Papers in European Industrial Policy, No. 1, EUNIP and H. Itami, "Mobilizing invisible assets: The key for successful corporate strategy," in *Information Resources and Corporate Growth*, ed. E. Punset and G. Sweeney (London: Pinter, 1989).

64 Cooke et al, "Regional Innovation Systems: Institutional and Organisational Dimensions," 480; Doloreux and Parto, "Regional Innovation Systems: Current Discourse and Unresolved Issues," 146-147.

65 Andrés Rodríguez-Pose, "Innovation Prone and Innovation Averse Societies: Economic Performance in Europe," *Growth and Change* 30 (1999): 81-82; Cooke et al., "Regional Innovation Systems: Institutional and Organisational Dimensions," 488; and *Constructing Regional Advantage: Principles, Perspectives, Policies* (Brussels: European Commission Directorate-General for Research, 2006), 59-60.

66 Cortright, "New Growth Theory, Technology and Learning: A Practitioner's Guide," 18 (paraphrasing Douglass C. North, *Institutions, Institutional Change and Economic Performance* (Cambridge, Massachusetts: Cambridge University Press, 1990)).

67 Douglass C. North, *Institutions, Institutional Change and Economic Performance* (Cambridge, Massachusetts: Cambridge University Press, 1990), 80-81, as quoted in Atkinson and Audretsch, *Economic Doctrines and Policy Differences: Has the Washington Policy Debate Been Asking the Wrong Questions?* 15.

68 See Schumpeter, *Capitalism, Socialism and Democracy*, 82-85.

69 For evidence of the influence of publicly and university-funded R&D, including both basic and applied research, see OECD, *Regions Matter: Economic Recovery, Innovation and Sustainable Growth*, 44-45; discussion in Ammon J. Salter and Ben R. Martin, "The Economic Benefits of Publicly Funded Basic Research: a Critical Review," Research Policy 30(3) (2001): 509-532, especially pages 515-516; Acs, *Innovation and the Growth of Cities*; and Jones, "Sources of U.S. Economic Growth in a World of Ideas," 229.

70 Dimitri Zenghelis, "The Economics of network-Powered Growth," Cisco White Paper (August, 2010).

71 See, e.g., "A Trace of 'Traces,'" *MOSAIC* 1(1) (1970): 14-19, for excerpts of a larger study that highlights the role key R&D events have played in the emergence of major innovations: *Technology in Retrospect and Critical Events in Science* (TRACES) (Washington, DC: National Science Foundation, 1969).

72 See, e.g., George S. Ford, Thomas M. Koutsky and Lawrence J. Spiwak, "A Valley of Death in the Innovation Sequence: An Economic Investigation," discussion paper prepared by the Phoenix Center for Advanced Legal and Economic Public Policy Studies for the Commerce Department, Technology Administration, September 2007; and Meyer, *Venture Capital: Bridge Between Idea and Innovation?* (Frankfurt: Deutsche Bank Research, May 2008). See also discussion in Fabio Bertoni, Massimo G. Colombo, Diego D'Adda, and Samuele Murtinu, "Venture Capital Financing and Innovation in European New Technology-Based Firms: a Longitudinal Analysis on the Role of the Type of Investor," Paper for the 2nd Conference on Corporate R&D, December 7-8, 2009. For discussion of the causes and impacts of a lower level of venture capital activity in the Great Lakes region, as compared to east- and west-coast locations, see Frank Samuel, *Turning Up the Heat: How Venture Capital Can Help Fuel the Economic Transformation of the Great Lakes Region* (Washington, DC: The Brookings Institution, 2010).

73 For example, Samila and Sorenson find that from 1993 to 2002, the availability of VC funding in a region positively affected new firm creation (even beyond those directly funded by VC), employment and aggregate income. Sampsa Samila and Olav Sorenson, "Venture Capital, Entrepreneurship and Regional Economic Growth," prepared under a grant from the Social Science and Humanities Research Council of Canada, August 5, 2008.

74 Meyer *Venture Capital: Bridge Between Idea and Innovation?*, 8; Ford, Koutsky and Spiwak, "A Valley of Death in the Innovation Sequence: An Economic Investigation"; "Between Invention and Innovation: An Analysis of Funding for Early-Stage Technology Development" (NIST), 35-36.

75 "Between Invention and Innovation: An Analysis of Funding for Early-Stage Technology Development" (NIST), 33.

76 Note, however, that innovation, of course, also takes place in existing firms of various sizes. The mechanisms described in the prior section, with regard to innovation in general, apply to both entrepreneurship and within-firm innovation — e.g., existing firms' innovative capacity is affected by the government and regulatory environment, the extent of networks linking the private sector to institutional researchers, the overall business environment and innovation culture of the region and so on. Evidence suggests, however, that in many places (though it varies from place to place), much innovative activity occurs via entrepreneurship and small firm growth. Identifying factors that influence these phenomena is therefore of particular interest. Acs, *Innovation and the Growth of Cities*, 18, 24-25; Meyer, "*Venture Capital: Bridge between idea and innovation?,*" 5. For a review of literature describing additional ways in which entrepreneurship drives growth, see Audretsch and Keilbach, "Entrepreneurship Capital and Economic Performance," 5-10.

77 Paul Geroski, "What Do We Know About Entry?" *International Journal of Industrial Organization* 13(4) (1995): 431.

78 Firm births plus deaths divided by the total number of firms.

79 Zoltan Acs and Pamela Mueller, "Employment effects of business dynamics: Mice, Gazelles and Elephants," Discussion Papers on Entrepreneurship, Growth and Public Policy #2306 (Jena, Germany: Max Planck Institute of Economics, 2006), ftp://papers.econ.mpg.de/egp/discussionpapers/2006-23.pdf; Zoltan Acs, William Parsons, and Spencer Tray, "High Impact Firms: Gazelles Revisited," (Washington, DC: Small Business Administration Office of Advocacy, 2008), http://www.sba.gov/advo/research/rs328tot.pdf; David Birch, "Who Creates Jobs?" *The Public Interest* 65 (1981): 3-14; Magnus Henrekson and Dan Johansson, "Gazelles as job creators: a survey and interpretation of the evidence," Ratio Institute Working Paper 117 (Stockholm: Ratio Institute, 2008), http://www.ratio.se/pdf/wp/mh_dj_gazelle.pdf.

80 The Kauffman Foundation (2007) distinguishes between "entrepreneurial capitalism," in which the driving force behind economic growth is the creation of small – but rapidly growing – firms, and the "managerial capitalism" of the 1950s and 1960s, during which time large corporations were seen as the primary drivers of the national economy. *On the Road to an Entrepreneurial Economy: A Research and Policy Guide, Version 2.0* (Kansas City, MO: Ewing Marion Kauffman Foundation, July 2007), 5.

81 The Kauffman Foundation (2007) cites specific regulatory areas that particularly affect entrepreneurs, including those around intellectual property, liability litigation and health care (2-3). Note that this paper focuses primarily on federal policy issues affecting entrepreneurship. The same issues, however, also extend to state and local policy. See also, the review of relevant studies of tax and regulatory climate's impact on entrepreneurs in Jill Taylor, *What Makes a Region Entrepreneurial? A Review of the Literature* (Cleveland: Cleveland State University, Maxine Goodman Levin College of Urban Affairs, September 2006), 12-14.

82 The Kauffman Foundation, *On the Road to an Entrepreneurial Economy*, (3).

83 The Kauffman Foundation, *On the Road to an Entrepreneurial Economy*, (22-23).

84 KIBS include both traditional professional and business services, such as legal, accounting, marketing, and so on, as well as more technology-intensive services such as software design, network design, environmental services, etc.

85 Emmanuel Muller and Andrea Zenker, "Business Services and Actors of Knowledge Transformation: the Role of KIBS in Regional and National Systems of Innovation," *Research Policy* 30 (2001): 1501-1516.

86 Walter W. Powell and Stine Grodal, "Networks of Innovators," in *The Oxford Handbook of Innovation*, Fagerberg, Mowery and Nelson, Eds., Powell and Grodall 2005 (66-67).

87 See generally, e.g., Nailya Kutzhanova, Thomas S. Lyons and Gregg A. Lichtenstein, "Skill-Based Development of Entrepreneurs and the Role of Personal and Peer Group Coaching in Enterprise Development, *Economic Development Quarterly* 23 (2009): 198-206.

88 Northwestern University is the exception, ranked #4 in licensing income by the Association of University Technology Managers in 2007. The University of Chicago ranked #20, and the University of Illinois (including both UIUC and UIC) ranked #31. The University of Chicago generated only 2 start-up firms from 2004-2007; Northwestern generated 23; and the U of I system generated 40. No other Chicago- area universities reported data to AUTM, presumably because of their small volume of tech transfer and commercialization activity. *Innovation Strategy Report* (Chicago: Chicago Metropolitan Agency for Planning, June 2009), 10.

89 Analysis conducted by The Brookings Institution Center for Metropolitan Policy, based on 2007 data from Harvard Business School's Institute for Strategy and Competitiveness Cluster Mapping Project http://data.isc.hbs.edu/isc and 2006 data from the Small Business Administration Office of Advocacy http://www.sba.gov/advo/research/data.html. All figures are for the 14-county Chicago-Naperville-Joliet, IL-IN-WI Metropolitan Statistical Area.

90 The tacit nature of the knowledge involved in these early stages necessitates higher levels of face-to-face interaction among key actors. Bengt-Åke Lundvall, Björn Johnson, Esben S. Andersen and Bent Dalum, "National Systems of Production, Innovation, and Competence Building," in *The Economic Geography of Innovation*, 217.

91 Jones, "Sources of U.S. Economic Growth in a World of Ideas," 220.

92 On the importance of better information to innovation in an economy characterized by uncertainty, see Atkinson and Audretsch, *Economic Doctrines and Policy Differences: Has the Washington Policy Debate Been Asking the Wrong Questions*?, 17.

93 Using 1986 to 1998 data from the SDC New Ventures database, the authors find that venture capitalists are twice as likely to invest in prospective businesses ten miles away than those 100 miles away. Olav Sorenson and Toby E. Stuart, "Syndication Networks and the Spatial Distribution of Venture Capital Investments," 1999, paper available through the Social Science Research Network (http://ssrn.com/abstract=220451): 33, 48, subsequently published under the same title in *American Journal of Sociology* 106 (6) (2001): 1546–1590.

94 The study uses a data set comprised of more than 23,000 venture-backed firms across the US. IHS Global Insight, *Venture Impact: The Economic Importance of Venture Capital-Backed Companies to the U.S. Economy* (Arlington, VA: National Venture Capital Association, 2009), 8.

95 Samila and Sorenson, "Venture Capital, Entrepreneurship and Regional Economic Growth," 5, 23-4.

96 The degree of geographic proximity exhibited by firms in clusters varies widely from one cluster to another, ranging from a few blocks (e.g., Manhattan's garment district) to several states (e.g., the Great Lakes' auto industry cluster). For the purposes of this paper, the primary unit of geographic reference is the metropolitan area, though the question is really empirical: any given cluster will have a specific geography of its members, which will often be sub-regional in scale. Cortright, "*Making Sense of Clusters: Regional Competitiveness and Economic Development*," 6.

97 Cortright, *Making Sense of Clusters*, 1. For further definition and discussion of the literature about the concept of clusters, see Edward Bergman and Edward Feser, "Industrial and Regional Clusters: Concepts and Comparative Applications," in *Web Book of Regional Science*, Regional Research Institute, West Virginia University, available at www.rri.wvu.edu/WebBook/Bergman-Feser/contents.htm.

98 Note that a cluster ecosystem is not the same as a membership organization or trade association — the cluster is defined by the economic interactions of its members, not their formal (or informal) organization. "The organizations that represent members and individuals are…one of the key organizations in a cluster but their membership does not constitute a cluster." Stuart Rosenfeld, "Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy?" *Journal of New Business Trends and Ideas* 3(2) (November 2005): 5-6.

99 "Urbanization economies" refers to the benefits realized by firms as a result of the aggregate level of economic activity in a given area, regardless of the mix of industries present — i.e., benefits that accrue to all firms. All firms in a region might benefit, for example, from shared pools of minimally specialized labor or from shared basic infrastructure, as well as from the cross-fertilization of ideas between diverse types of firms. See, generally, Jane Jacobs, *The Economy of Cities* (New York: Random House, 1969). For further empirical evidence in support of the theory, see, e.g., Maryann Feldman and David Audretsch, "Innovation in Cities: Science-based Diversity, Specialization and Localized Competition," *European Economic Review* 43 (1999): 409-429 and Edward Glaeser, Hedi Kallal, Jose Scheinkman and Andrei Shleifer, "Growth in Cities," NBER Working Paper 3787, 1991.

100 Note that clusters come in many shapes and sizes, and that what economic functions are clustering is changing in the knowledge economy, as discussed below. While for ease of explanation at this point in the discussion, references in the text are often to industry specialization, the discussion applies equally to occupational, function and other kinds of specializations.

101 See, generally, discussion in Maryann Feldman, "Location and Innovation: the New Economic Geography of Innovation, Spillovers, and Agglomeration," in *The Oxford Handbook of Economic Geography*, 383-384.

102 See, generally, Porter, *Competitive Advantage: Creating and Sustaining Superior Performance*; Edward Glaeser and Joshua Gottlieb, "The Wealth of Cities: Agglomeration Economies and Spatial Equilibrium in the United States," *Journal of Economic Literature* 47(4) (2009): 1005; Marshall, *Principles of Economics*; Henderson, "Marshall's Scale Economies"; Edward Glaeser, ed., *Agglomeration Economies* (National Bureau of Economic Research Conference Report); and Paul Krugman, *Geography and Trade* (Cambridge: MIT Press, 1992). Also see, in *Handbook of Regional and Urban Economics*, vol. 4, ed. J. Vernon Henderson and Jacques-François Thisse (Amsterdam: North-Holland, 2004): Stuart Rosenthal and William Strange (2004) "Evidence on the Nature and Sources of Agglomeration Economies" and Gilles Duranton and Diego Puga, "Microfoundations of Urban Agglomeration Economies."

103 Michael E. Porter, *The Competitive Advantage of Nations* (New York: Free Press, 1990), 78.

104 Stuart Rosenfeld, *A Governor's Guide to Cluster-based Economic Development* (Washington, DC: National Governors Association, 2002), 37.

105 See, e.g., Michael E. Porter, "Locations, Clusters, and Company Strategy," in *The Oxford Handbook of Economic Geography*, 253-274 and Rosenfeld, "Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy?"

106 Rosenfeld, "Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy?", 8.

107 See Glaeser, "Are Cities Dying." While clusters are inherently about proximity, this "closeness" is multi-dimensional, rather than defined strictly in terms of geographic proximity. The proximity relationships between cluster firms can also be described in terms of "technological distance" (similarity in the technologies businesses employ), "skill distance" (similarity of workers' skills and the degree to which pools of qualified workers are easily accessible), "market distance" (similarity and connectedness of customers) and "social distance" (the kinds of interactions between the managers and employees of different businesses). See discussion in Cortright, *Making Sense of Clusters: Regional Competitiveness and Economic Development*," 4.

108 See, e.g., Rosenfeld, "Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy?" 11-12.

109 At the same time, the information technology innovations associated with the knowledge economy reduce the cost of sharing, managing and communicating certain types of information across disparate geographies, allowing firms to separate functions that previously needed to be located in the same place.

110 Duranton and Puga, "From Sectoral to Functional Urban Specialization." For further evidence of functional specialization, see also Elisa Barbour and Ann Markusen, "Regional Occupational and Industrial Structure: Does the One Imply the Other?" *International Regional Science Review* 30(1) (2007): 1-19.

111 See, e.g., William Wheaton and Mark Lewis, "Urban Wages and Labor Market Agglomeration," *Journal of Urban Economics*, 51 (2002): 542-562; Drennan et al, "Sectoral Shares: Specialisation and Metropolitan Wages in the United States, 1969-96," *Urban Studies*, 39(7) (2002): 1129-1142; and Breandan O'Huallachain, "Economic Structure and Growth of Metropolitan Areas," in *Sources of Metropolitan Growth*, ed. Edwin S. Mills and John F. McDonald, (New Brunswick, NJ: Rutgers University, Center for Urban Policy Research, 1992).

112 For a discussion of "specialization versus diversification" in recent literature, see Cortright, *Making Sense of Clusters: Regional Competitiveness and Economic Development*, 39-42, in which the author concludes that the effects may depend on differences in specific metropolitan regions; see also, Weissbourd and Berry, *The Changing Dynamics of Urban America*, 37-49.

113 Rosenfeld, "Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy?" 7, 12.

114 Porter's four basic conditions are (a) production conditions (skilled workforce, specialized infrastructure and educational institutions); (b) demand conditions (sophisticated demanding local customers that force firms to innovate); (c) related industries (local suppliers that support and cooperate with cluster firms: and (d) firm strategy, structure and rivalry conditions (providing the motivation for innovation and differentiation among firms). See Porter, *The Competitive Advantage of Nations*, 71-124.

115 Cortright's seven "micro-foundations are: labor market pooling; specialized suppliers; knowledge spillovers; entrepreneurship; path dependence (meaning that as a cluster matures, its options for evolving narrow); culture (particularly the social relationships among firms); and local demand. Cortright, *Making Sense of Clusters: Regional Competitiveness and Economic Development*, 18-27.

116 Limitations include (a) the challenges of obtaining and analyzing meaningful data that accurately capture the dimensions and dynamics of regional clusters; (b) the difficulty of the cross-jurisdictional cooperation necessary to address the geographic scope of most clusters; (c) governments cannot create clusters, only businesses can, and many have been created via "historical accidents;" and (d) industry clusters organize for economic advantage, not to meet social goals of the community, meaning their interests and priorities often may not align with public-sector goals to reduce poverty or increase social equity. See, Rosenfeld, "Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy?," 6-10.

117 See, e.g., Timothy Bresnahan, Alfonso Gambardella and AnnaLee Saxenian, "'Old Economy' Inputs for 'New Economy' Outcomes: Cluster Formation in the New Silicon Valleys," *Industrial and Corporate Change* 10(4) (2001): 841-843.

118 See Stuart Rosenfeld, *Just Clusters: Economic Development Strategies that Reach More People and Places* (Carrboro, NC: Regional Technology Strategies, Inc., 2002); and Ron Martin and Peter Sunley, "Deconstructing Clusters: Chaotic Concept or Policy Panacea?" *Journal of Economic Geography* 3 (2003): 28.

119 See, generally, Cortright, *Making Sense of Clusters: Regional Competitiveness and Economic Development*; Mikel Landabaso and Stuart Rosenfeld, "Public Policies for Industrial Districts and Clusters," draft, June 2008, 11 (subsequently published in *A Handbook of Industrial Districts*, ed. Marco Bellandi, Lisa De Propris and Giacomo Becattini (Cheltenham: Edward Elgar Publishers, 2009)); Rosenfeld, "Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy?" 11-12.

120 The only leverage point not referenced below concerns spatial efficiency. This can be important to strengthening clusters both in the narrow sense of providing close proximity of firms and related institutions in a cluster to facilitate face-to-face interaction (such as Research Triangle Park) or in the very broad sense that reducing transportation costs will provide benefits to the firms in a cluster (as it does to all firms). The first is not the subject of GO TO 2040 recommendations, and the second is discussed elsewhere and not particular to clusters, so this leverage point as it impacts clusters is not further addressed.

121 See, e.g., Landabaso and Rosenfeld, "Public Policies for Industrial Districts and Clusters," 11.

122 A related example is provided by the "Green Wave Initiative" created by the nation's two largest pension funds (CALpers and CALSTERS), which will invest $500 million of private equity, venture capital and project financing for clean technology companies. "State Treasurer Phil Angelides Launches 'Green Wave' Environmental Investment Initiative to Bolster Financial Returns, Create Jobs and Clean up the Environment," News Release, California State Treasurer's Office, February 3, 2004.

123 These organizations often evolve to engage and even be run by members of the cluster firms, playing an ongoing role in addressing the needs of firms as the cluster grows and matures. Landabaso and Rosenfeld, "Public Policies for Industrial Districts and Clusters," 8.

124 See, Landabaso and Rosenfeld, "Public Policies for Industrial Districts and Clusters," 9.

125 Rosenfeld, "Industry Clusters," 11.

126 Rosenfeld, "Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy?" 12.

127 See Cortright, *Making Sense of Clusters: Regional Competitiveness and Economic Development*, v, 46-50 ("Clusters and Public Policy").

128 See *Industry Clusters: CMAP Regional Snapshot*, 12-13, for a description of 10 clusters identified using a methodology developed for the Economic Development Administration by the Center for Regional Development at Purdue University. GO TO 2040's policy recommendations also reference an emerging 11th cluster of water-and energy-efficiency goods and services.

129 CMAP, *Industry Cluster Analysis: Regional Economic Base Analysis*, 25 and CMAP, *Industry Clusters: CMAP Regional Snapshot*, 15.

130 See GO TO 2040, 184, 190, 194.

131 Wage premiums (which existed in 13 of the 18 manufacturing industry clusters studied), ranged from 1.4% to 11.9%, and were even higher in rural clusters. Robert M. Gibbs and G. Andrew Bernat, Jr., "Rural Industry Clusters Raise Local Earnings," *Rural Development Perspectives* 12(3) (April 2001): 21-23.

132 The study examines a set of 77 manufacturing industries (3-digit SIC codes) and 424 occupations across 220 MSAs and CMSAs. Wheaton and Lewis, "Urban Wages and Labor Market Agglomeration," 556.

133 See, e.g., Drennan et al, "Sectoral Shares, Specialisation and Metropolitan Wages" and O'Huallachain, "Economic Structure and Growth of Metropolitan Areas."

134 As of 2005, 37,500 rail cars per day traveled through the Chicago region, amounting to nearly 60% of all U.S. rail intermodal traffic and one third of all U.S. rail traffic. As of 2002, more than 746 million tons of truck-based freight (nearly 61mllion truckloads) traveled through the Chicago region. *Chicago Region Environmental and Transportation Efficiency (CREATE) Program Final Feasibility Plan* (Federal Highway Administration, Illinois Department of Transportation and Chicago Department of Transportation, August 2005), 37; and Joseph Bryan, Glen Weisbrod and Carl D. Martland, "Rail Freight as a Means of Reducing Roadway Congestion: Feasibility Considerations for Transportation Planning," paper drafted for the Transportation Research Board Committee AR040, Local and Regional Rail Freight Transport, November 9, 2006, 7. Cambridge Systematics, Inc., "Regional Freight System Planning Recommendations: Regional Framework and Policy Recommendations," prepared for the Chicago Metropolitan Agency for Planning, February 3, 2010, 7.

135 U.S. Census Bureau's 2007 County Business Patterns and *Industry Cluster Analysis: Regional Economic Base Analysis* (CMAP), 11.

136 GO TO 2040, 194.

137 Motorist, passenger and freight rail delays and congestion are daily occurrences, and if rail capacity in particular is not addressed, the region stands to lose $2 billion in production and 17,000 jobs during the next 20 years. Additionally, a portion of the freight that currently moves by rail will shift to truck transport, further increasing highway congestion. *CREATE Final Feasibility Plan*, 37.

138 Freight transportation delays are a significant hindrance to on-time deliveries via both road and rail. Cambridge Systematics, Inc., "Regional Freight System Planning Recommendations," 6-4.

139 See, e.g., Lawrence H. Summers, "Rescuing and Rebuilding the U.S. Economy: A Progress Report," remarks at the Peterson Institute for International Economics. July 17, 2009; "Remarks by the President in the State of the Union Address," Washington, DC, January 27, 2010; Bruce Katz, "The Next Economy: Transforming Energy and Infrastructure Investment," conference presentation, East Palo Alto California, February 2-3, 2010; and "Strengthening the American Labor Force" in T*he Economic Report of the President* (Washington, DC: U.S. Government Printing Office, February 2010).

140 See Summers, "Rescuing and Rebuilding the U.S. Economy"; "Remarks by the President in the State of the Union Address"; Katz, "The Next Economy: Transformng Energy and Infrastructure Investment": and "Strengthening the American Labor Force" in *The Economic Report of the President* (note 139).

141 See, e.g., *The Clean Energy Economy: Repowering Jobs, Businesses and Investments Across America* (Washington, DC: The Pew Charitable Trusts, 2009); "WBC Green Technology Strategy: Steering Committee Final Update," presented to the Project Steering Committee of World Business Chicago by Bain & Company, December 18, 2008; and James Nixon, *Sustainable Economic Development: Initiatives, Programs, and Strategies for Cities and Regions* (Urban Sustainability Associates, July 2009).

142 The Chicago Climate Action Plan (CCAP) declares a goal of retrofitting 50% of existing commercial buildings and residential units (up to 400,000) by 2020. The goal for each retro fit is a 30% reduction in energy consumption, with further efficiency/conservation gains from appliance trade-ins, tree planting, green roofs, and other building-related measures. *Chicago Climate Action Plan* (Chicago: Chicago Climate Task Force, 2008), 20, 22, 51.

143 See RW Ventures and O-H Community Partners, "Market Development for Building Energy Efficiency Retrofits," concept paper (December 2008) and *Chicago Retrofit Strategy Report* (Chicago: Booz&Co for City of Chicago), available from authors.

144 RW Ventures and O-H Community Partners, "Market Development for Building Energy Efficiency Retrofits,"25 (analysis conducted by the Center for Neighborhood Technology includes direct impacts only, not indirect/multiplier effects).

145 Marilyn A. Brown et al., *Energy Efficiency in the South* (Atlanta: Southeast Energy Efficiency Alliance, April 12, 2010), 135.

146 See, e.g.,, discussion in Joseph Cortright, "New Growth Theory, Technology and Learning: A Practitioners Guide," 26: "countries, regions or cities that are among the first to develop a particular industry may benefit from the positive feedbacks or increasing returns that encourage the industry to become more concentrated in a particular location, resulting in an enduring pattern of economic activity."

147 For example, one estimate of the potential size of the low-carbon environmental goods and services (LCEGS) suggests £629 billion (approximately $1.25 trillion) worth of potential in the US and £3,046 billion ($6.04 trillion) globally, in 2007/8. Globally, building technologies are the second largest component of the 23 analyzed (behind only alternative fuels), representing 12.8% of the total, with energy management representing an additional 2.4% of the global market. *Low Carbon and Environmental Goods and Services: An Industry Analysis* (London: U.K. Department of Business, Innovation and Skill, 2009), 4-5. Dollar figures assume dollar-pound exchange rate as of December 31, 2007, obtained from the Federal Reserve Board's Foreign Exchanges Rates release, accessed July 20, 2010 (http://www.federalreserve.gov/releases/h10/Hist/datoo_uk.htm).

148 *Chicago Climate Action Plan*, 22.

149 "WBC Green Technology Strategy: Steering Committee Final Update," 22-25.

150 Features of spatial efficiency began to make their way into the new economic geography literature after the publication of Paul Krugman's 1991 paper, earning him a Nobel Prize for his pioneering work in this field. His prediction that low transportation costs and economies of scale will cause production to agglomerate and labor to in-migrate to the regions with a higher initial level of production led to a series of publications examining the spatial concentration of firms. Economic geography continues to be a rising field of study. See Paul Krugman, "Increasing Returns and Economic Geography," *Journal of Political Economy* 99(3) (1991): 483-99. See, generally, Clark, Feldman and Gertler, eds., *The Oxford Handbook of Economic Geography* and Edward Glaeser, ed., *Agglomeration Economics*. Among practitioners, the Smart Growth and New Urbanism movements, in particular, have highlighted the negative social and economic consequences of sprawl and low-density development patterns, often making the argument that dense, mixed-use and transit-friendly communities are a more efficient way to grow regional economies. See, e.g., Bruce Katz, *Smart Growth: The Future of the American Metropolis?* (London: Centre for Analysis of Social Exclusion, London School of Economics, July 2002).

151 "…all else being equal, large cities that are compact and enjoy good accessibility matched by efficient transport infrastructure (i.e., good mobility) are among the most productive of all urban settlements." Robert Cervero, "Efficient Urbanisation: Economic Performance and the Shape of the Metropolis," *Urban Studies* 38(10) (2001): 1652, 1668. See also Bumsoo Lee and Peter Gordon, "Urban Spatial Structure and Economic Growth in U.S. Metropolitan Areas," presented at the Annual Meeting of the Western Regional Science Association, 2007, 3, 11, 13 and Andrea Sarzynski and Alice Levy, "Spatial Efficiency and Regional Prosperity," July 2010, 1 (unpublished draft).

152 A related phenomenon is concentrated poverty, which in part reflects and reinforces spatial inefficiency, and imposes additional economic costs. It is treated here in the discussion of worker-to-employer inefficiencies.

153 Weissbourd and Berry, *The Changing Dynamics of Urban America*, 61-69 and Sarzynski and Levy, "Spatial Efficiency and Regional Prosperity," 2.

154 See discussion in Chapter II; see also, Riccardo Bodini and Robert Weissbourd, *Dynamic Neighborhoods: New Tools for Community and Economic Development* (New York and Washington, DC: Living Cities, 2010).

155 *Beyond Sprawl: New Patterns of Growth to Fit the New California*, sponsored by the California Resources Agency, Bank of America, Greenbelt Alliance and the Low Income Housing Fund, available at http://www.landwatch.org/pages/perspectives/sprawlreport.htm; Koslowsky, Meni, Avraham N. Kluger and Mordechai Reich, *Commuting Stress: Causes, Effects, and Methods of Coping* (New York: Plenum Press, 1995), as paraphrased in Alois Stutzer and Bruno S. Frey, "Stress that Doesn't Pay: The Commuting Paradox," Institute for the Study of Labor (IZA) Discussion Paper Series, IZA DP No. 1278, August 2004, 5 ("The strain of commuting is associated with…increased lateness, absenteeism and turnover at work, as well as adverse effects on cognitive performance."); "Building Our Economy: Transportation for a New Illinois," unpublished draft, Chicago Metropolis 2020, July 2010, 24-25; and Ihlanfeldt, "The Geography of Economic and Social Opportunity in Metropolitan Areas," 216.

156 For example, a 30 mph car trip has about 15 cent/mile operating costs, while time costs for the same trip tally 25 cents/mile, or approximately $6/hour. These time costs are magnified under urban-peak driving conditions: at 32 cents/mile, they represent more than one-third of the total cost of vehicular transportation. *Transportation Cost and Benefit Analysis II: Travel Time Costs* (Victoria, BC: Victoria Transport Policy Institute, June 2010), 5.2-6.

157 Stutzer and Frey, "Stress that Doesn't Pay: The Commuting Paradox," 22.

158 *Recommendations for Developing Affordable Workforce Housing in the Chicago Region* (Chicago: Chicago Metropolis 2020, 2002), 10.

159 In fact, many "workers are removed from large portions of the job market simply because they cannot get to where the new jobs are," according to *Beyond Sprawl: New Patterns of Growth to Fit the New California*.

160 See, generally, Manuel Pastor et al., *Regions that Work: How Cities and Suburbs Can Grow Together* and Weissbourd and Berry, *The Changing Dynamics of Urban America*, especially 90 and 110.

161 See William Julius Wilson, *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy* (Chicago: University of Chicago Press, 1987), esp. 42, 55.

162 For a study of job location patterns, see Edward Glaeser, Matthew Kahn, and Chenghuan Chu, *Job Sprawl: Employment Location in U.S. Metropolitan Areas* (Washington, DC: The Brookings Institution Center on Urban and Metropolitan Policy, 2001).

163 See Steven Raphael and Michael Stoll, "Can Boosting Minority Car-Ownership Rates Narrow Inter-Racial Employment Gaps?" Working Paper Series, No. Woo-002, University of California-Berkeley, Program on Housing and Urban Policy, 2000, 4 (low-income households tend to reside in areas in which low-and semi-skilled jobs are scarce compared to the supply of comparably skilled workers).

164 Raphael and Stoll, "Can Boosting Minority Car-Ownership Rates Narrow Inter-Racial Employment Gaps?" 4.

165 As of 2010, AAA estimates that the average cost of owning, maintaining and driving a car to be $9,520 annually (based on 20,000 miles/year). *Your Driving Costs: How Much are You Really Paying to Drive?* (Heathrow, FL: American Automobile Association, 2010), 7.

166 John P. Blair and Michael C. Carroll, "Inner-City Neighborhoods and Metropolitan Development," *Economic Development Quarterly* 21(3) (2007): 263-267.

167 See, e.g., Edith Elmer Wood, *Slums and Blighted Areas in the United States* (Washington, DC: U.S. Government Printing Office, Federal Emergency Administration of Public Works, Housing Division, 1935); Fred Case, "Prediction of the Incidence of Urban Residential Blight," *Papers in Regional Science* 11(1) (1963): 214; and Wilson, *The Truly Disadvantaged*, 21, 56-57.

168 For example, De Vlieger et al. find that vehicles used 20 - 45% more fuel during congested rush hour traffic than during less congested hours of the day, while field tests by Spalding revealed that vehicles used, on average, 30% more fuel during peak travel times than during non-peak travel periods. (I. De Vlieger, D. De Keukeleere and J.G. Kretzschmar, "Environmental Effects of Driving Behavior and Congestion Related to Passenger Cars," *Atmospheric Environment* 34 (2000): 4649. Steve Spalding, *RACQ Congested Roads Report: The Effects on Fuel Consumption and Vehicle Emissions* (Queensland: Royal Automobile Club of Queensland, January 5, 2008), 3.

169 Glaeser and Gottlieb, "The Wealth of Cities: Agglomeration Economies and Spatial Equilibrium in the United States," 983, 1000, 1015-1016.

170 In addition to average travel time, the variance in potential travel times is also a very real and important cost of transportation, as transportation and distribution firms must buffer estimated driving times to ensure on-time arrivals (as noted in the Trucking discussion in section 7.2 of GO TO 2040). Reducing the variability in travel times, even if the average remains largely unchanged, can result in a valuable cost savings for the transportation industry.

171 Note that, here too, if not kept in check, rising congestion from concentration may erode the benefits of such closely co-located economic assets. For example, in a firm-level analysis of the U.K. and Italy, negative (congestion) effects were found to offset spillover advantages and the benefits of industry co-location. Catherine Beaudry and Stefano Breschi, "Does Clustering Really Help Firms' Innovative Activities?" CESPRI Working Paper #111, July 2000, 25, 27, 29.

172 For example, implementation of a comprehensive mobility management program (including design features that improve walking, cycling, and public transit) has been shown to measurably reduce the volume of vehicle traffic. Todd Litman, *Win-Win Transportation Solutions* (Victoria, BC: Victoria Transport Policy Institute, 2007), 19. Similarly, a study simulating expansion of the public transit system in Chicago finds that the result is a meaningful increase in transit ridership, thereby reducing vehicular traffic. Nathaniel Baum-Snow and Matthew Kahn, "The Effects of New Public Projects to Expand Urban Rail Transit," *Journal of Public Economics* 77 (2000): 255. See also, e.g., Lawrence Frank, Brian Stone, Jr. and William Bachman, "Linking Land Use with Household Vehicle Emissions in the Central Puget Sound: Methodological Framework and Findings," *Transportation Research Part D: Transport and Environment* 5(3) (2000): 173-196.

173 See, e.g., *A Study of Land Use, Transportation, Air Quality, and Health (LUTAQH) in King County, WA (King County, WA*: Lawrence Frank and Company, Inc., 2005), 7 and Antonio M. Bento, Maureen L. Cropper, Ahmed Mushfiq Mobarak and Katja Vinha, "The Impact of Urban Spatial Structure on Travel Demand in the United States," Policy Research Working Paper 3007, The World Bank Development Research Group, Infrastructure and Environment, 2003, 20, 30.

174 See, e.g., ICF Incorporated, *Opportunities to Improve Air Quality Through Transportation Pricing* (Washington, DC: USEPA Office of Mobile Sources, 1997) and discussion in Richard Wronski, "To Cut Gridlock, Drivers Should Pay for Fast Lane, Study Says," Chicago Tribune (online edition), July 13, 2010.

175 The most recent data available is for 2007. David Schrank and Tim Lomax, *2009 Annual Urban Mobility Report* (College Station, TX: Texas Transportation Institute, July 2009), 22, 24.

176 *Moving at the Speed of Congestion: The True Costs of Traffic in the Chicago Metropolitan Area* (Chicago: Metropolitan Planning Council, August 2008), 2 and "Regional Freight System Planning Recommendations," 6-4.

177 *2009 Bottleneck Analysis of 100 Freight Significant Highway Locations* (Washington, DC: American Transportation Research Institute (ATRI) and the Federal Highway Administration (FHWA) Office of Freight Management and Operations), summarizing the findings of *Freight Performance Measures 2009 Bottleneck Report* (forthcoming). Accessed online May 27, 2010 at http://www.atri-online.org/index.php?option=com_content&view=article&id=248&Itemid=75.

178 *Moving at the Speed of Congestion: The True Cost of Traffic in the Chicago Metropolitan Area*, 5. Note that this cost estimate accounts only for time lost due to delays, and does not include the cost of additional fuel usage. This $1 billion represents about 14% of the $78.3 billion overall congestion costs estimated in the report.

179 Analysis conducted by The Brookings Institution Center for Metropolitan Policy, using 2008 data from the U.S. Census Bureau American Community Survey.

180 *Recommendations for Developing Attainable Workforce Housing in the Chicago Region*, 19.

181 *A Heavy Load: The Combined Housing and Transportation Burdens of Working Families* (Washington, DC: Center for Housing Policy, 2006), 10.

182 That is, limiting investments made to expand urban highways, which can stimulate vehicle travel and sprawl in urban/metro areas. Todd Litman, *Transportation Elasticities: How Prices and Other Factors Affect Behavior* (Victoria, BC: Victoria Transport Policy Institute, March 2010), 17, 52-53.

183 This is particularly important to households in the face of rising gas prices and the collapse of the housing market bubble, which have led households to place a higher value on and increase relative demand for these denser, more central residential locations (versus lower-density locations on the suburban fringe) in which less driving is required on a day-to-day basis. See Joseph Cortright, *Driven to the Brink: How the Gas Price Spike Popped the Housing Bubble and Devalued the Suburbs* (Chicago: CEOs for Cities, May 2008).

184 Moody's Economy.com figure for 2008, as cited in *Industry Clusters: CMAP Regional Snapshot*, 5.

185 CMAP estimate, 2010, via email message to the author, April 13, 2010.

186 Note that access to rail transport, in particular, can provide a cost advantage given the significantly lower fuel costs. See, generally, *Preliminary National Rail Plan: The Groundwork for Developing Policies to Improve the United States Transportation System* (Washington, DC: Federal Railroad Administration, 2009).

187 *Moving at the Speed of Congestion: The True Cost of Traffic in the Chicago Metropolitan Area*, 14.

188 U.S. Department of Transportation Federal Highway Administration figure for the Chicago-Gary-Kenosha Consolidated Metropolitan Statistical Area (http://www.fhwa.dot.gov/ctpp/jtw/jtw8.htm).

189 Note, also, that properties near transit will already pay higher property taxes by virtue of the higher land value associated with proximity to transit.

190 Todd Litman, *Rail Transit in America: A Comprehensive Evaluation of Benefits* (Victoria, BC: Victoria Transportation Policy Institute, 2006).

191 See, e.g., Bento et al., "The Impact of Urban Spatial Structure on Travel Demand in the United States," and *Time is Money: The Economic Benefits of Transit Investment* (Chicago: Chicago Metropolis 2020, 2007).

192 The authors studied more than 100 urbanized areas in the U.S. Bento et al., "The Impact of Urban Spatial Structure on Travel Demand in the United States," Table 10.

193 Litman, *Rail Transit in America: A Comprehensive Evaluation of Benefits*, 9.

194 Glen Weisbrod, Don Vary and George Treyz, *Economic Implications of Congestion, NCHRP Report* 463 (Washington, DC: Transportation Research Board — National Research Council, 2001), 4-5, 47.

195 Todd Litman, *London Congestion Pricing: Implications for Other Cities* (Victoria, BC: Victoria Transport Policy Institute, January 2006), 7-8, 10-11 and generally, Andrew W. Evans, "Road Congestion Pricing: When is it a Good Policy?" *Journal of Transport Economics and Policy* 26(3) (1992): 213-243.

196 For a discussion of multiple studies addressing parking and congestion pricing, see ICF Incorporated, *Opportunities to Improve Air Quality Through Transportation Pricing*, 30-33.

197 While GO TO 2040 recommends investing proceeds from the new motor fuel and user fees in additional transit infrastructure, the result could still be the effective exclusion of a segment of the regional population from use of public infrastructure.

198 Note that "doubling county-level density" refers to the doubling of a density index developed by the study's authors, rather than an explicit mathematical doubling of the number of persons per square mile. Antonio Ciccone and Robert E. Hall, "Productivity and the Density of Economic Activity," *American Economic Review* 86 (1996): 62.

199 *A Study of Land Use, Transportation, Air Quality, and Health (LUTAQH) in King County, WA*, 7.

200 Bento et al., "The Impact of Urban Spatial Structure on Travel Demand in the United States," 20, 30.

201 Primarily in the "Housing and Social Systems" and "Quality of Life" sections of the "Challenges and Opportunities" chapter, but also lightly in the "Land Use and Housing" and "Increase Commitment to Public Transit" chapters.

202 For a review of the literature on education and economic growth at the nation, state, and metropolitan area levels see: Gottlieb and Fogarty, "Educational Attainment and Metropolitan Growth," 325-336. See also Andrew Gunder Frank, "Human Capital and Economic Growth," *Economic Development and Cultural Change* 8 (1960): 170-173 for a discussion of the role of education and training in 19th century US productivity gains.

203 Nobel Laureate Gary Becker's pioneering work on the subject refers to the "imbedding of resources into people." Gary S. Becker, "Investment in Human Capital: A Theoretical Analysis," *The Journal of Political Economy* 70(5) (1962): 9.

204 Gottlieb and Fogarty, "Educational Attainment and Metropolitan Growth," 325-336. See also Pamela Blumenthal, Harold Wolman, and Edward Hill, "Understanding the Economic Performance of Metropolitan Areas in the United States," *Urban Studies* 46 (3): (2007) 605-627. From 1990 to 2000, initial-year human capital (share of population with bachelor degrees or higher) is positively and significantly related to GMP and employment growth.

205 "Knowledge economy" refers here to the increasing importance of information and knowledge resources (a) as inputs to production, (b) in the production and market process and (c) as products and services in and of themselves. See discussions in Weissbourd and Berry, *The Changing Dynamics of Urban America*, 24-27; Drennan, *The Information Economy and American Cities*; and J. Houghton and P. Sheehan, *A Primer on the Knowledge Economy*.

206 Both innovation and entrepreneurship are closely tied to human capital stock, because people with knowledge, ideas and skills provide the pool from which innovators and entrepreneurs emerge. See Mathur, "Human Capital-Based Strategy for Regional Economic Development."

207 Berry, Bodini and Weissbourd, *Grads and Fads: The Dynamics of Human Capital Location*, 4.

208 Weissbourd and Berry, *The Changing Dynamics of Urban America*, 32. See also Eberts, Erickcek and Kleinhenz, *Dashboard Indicators for the Northeast Ohio Economy:* Prepared for the Fund for Our Economic Future.

209 Due to these productivity benefits of density, skilled workers in metropolitan economies command higher wages than similarly skilled workers in less dense economies, an effect known as the urban wage premium. Wheeler, for example, finds that a one-standard-deviation increase in log population or density of a metropolitan area is accompanied by an approximately 0.2% increase in the annual rate of within-job wage growth. Reflecting the extent to which dense, urban economies facilitate more productive firm-worker matches, Wheeler also finds that the same increase in log population or density results in an average 1% increase in wages when workers move between jobs. Christopher Wheeler, "Cities and the Growth of Wages Among Young Workers: Evidence from the NLSY." Working Paper 2005-055A, The Federal Reserve Bank of St. Louis, 2005.

210 See Gottlieb and Fogarty, "Educational Attainment and Metropolitan Growth," 326; and Glaeser and Gottlieb, "The Wealth of Cities: Agglomeration Economies and Spatial Equilibrium in the United States," 983, 1012.

211 See Wheeler, "Cities and the Growth of Wages Among Young Workers: Evidence from the NLSY,"; and Christopher Wheeler, "Search, Sorting, and Urban Agglomeration," *Journal of Labor Economics* 19 (4) (2001): 879-99.

212 Weissbourd and Berry, *The Changing Dynamics of Urban America*, 32. In a statistical analysis examining the impact of myriad characteristics of Metropolitan Statistical Areas (MSAs) on economic growth through the 1990s, the effect of the educational attainment variables (a conventional proxy for human capital more broadly) was larger than for all other independent variables. Roughly, for each 2% increase in the proportion of adults with college degrees in a MSA in 1990, income growth from 1990-2000 increased by about 1%. See also Eberts, Erickcek, and Kleinhenz, *Dashboard Indicators for the Northeast Ohio Economy: Prepared for the Fund for Our Economic Future*. In an analysis of 118 metropolitan areas similar in size to those in Northeast Ohio, having a skilled workforce was found to be the primary driver of economic growth between 1994 and 2004, correlated most highly with output, per capita income, and productivity.

213 A one-year increase in average educational attainment in a metropolitan area increases total factor productivity by about 3%, productivity in manufacturing jobs by 8.5%, and productivity in non-manufacturing jobs by 12.5%. See both R. Lucas, "On the Mechanics of Economic Development," *Journal of Monetary Economics* 22 (July 1988): 3-42 and J. Rauch, "Productivity Gains from Geographic Concentration of Human Capital: Evidence from Cities," *Journal of Urban Economics* 34 (1993): 380-400.

214 Moretti finds that a one percentage point increase in college share in a Metropolitan Statistical Area (MSA) raises average wages by 0.6%-1.2% above and beyond the private return to education, generally agreed to be an 8-12% increase in earnings per each additional year of schooling (all else equal). This finding indicates that there are positive externalities associated with human capital accumulation. See: Enrico Moretti, "Human Capital Externalities in Cities," Working Paper 9641, National Bureau of Economic Research, 2003. See also J. Mincer, *Schooling, Experience, and Earnings* (New York: Columbia University Press, 1974). One of the first economists to formally study the relationship between human capital and wages, Jacob Mincer calculated that workers' individual annual earnings rose by 7% across the 1950s and 1960s for every year of additional schooling.

215 Between 1940 and 1990, a 10% increase in a metropolitan area's concentration of college-educated residents was associated with a 0.8% increase in employment growth, two thirds of which is accounted for by productivity enhancements based on skill. The remaining third was attributable to quality of life improvements due to social externalities. Jesse Shapiro, "Smart Cities: Quality of Life, Productivity, and the Growth Effects of Human Capital," Working Paper No. 11615, National Bureau of Economic Research, September 2005.

216 Paul D. Gottlieb and George Joseph, "College-to-Work Migration of Technology Graduates and Holders of Doctorates within the United States," *Journal of Regional Science* 46(4) (2006): 627-659; see also Berry, Bodini and Weissbourd, *Grads and Fads: The Dynamics of Human Capital Location*.

217 As further discussed below, transaction costs include finding and measurement costs for employers and job seekers to make a match. In order to form productive matches, firms and workers must be able to easily and effectively find and evaluate each other. Market barriers range from the jobs-housing mismatch discussed in the spatial efficiency chapter to skills evaluation and credentialing problems discussed below.

218 The attraction and retention literature focuses primarily on knowledge workers, particularly college graduates, for several reasons. As discussed, higher human capital workers contribute more to productivity, and college degree attainment is the most readily available data to proxy knowledge workers. Also, better educated individuals are significantly more likely to migrate between regions than low-skilled workers. Current Population Survey (CPS) data from 1981-2000 indicates that individuals with a college degree are 82% more likely to migrate in any given year than high-school dropouts. See Emek Basker, "Education, Job Search and Migration," (2002) University of Missouri-Columbia Working Paper No. 02-16. Available at http://ssrn.com/abstract=371120 or doi:10.2139/ssrn.371120.

219 For the most popular articulation of this view, see, Richard Florida, *The Rise of the Creative Class and How It's Transforming Work, Leisure, Community, and Everyday Life,* (New York: Basic Books, 2002).

220 Berry, Bodini and Weissbourd, *Grads and Fads: The Dynamics of Human Capital Location*. See also Michael Storper and Allen Scott, "Rethinking Human Capital, Creativity and Urban Growth," *Journal of Economic Geography* 9 (2009): 147-167; Gottlieb and Joseph, "College-to-Work Migration of Technology Graduates and Holders of Doctorates within the United States," 627-659; Eberts, Erickcek and Kleinhenz, "Dashboard Indicators for the Northeast Ohio Economy: Prepared for the Fund for Our Economic Future,"; Paul Gottlieb, "Economy Versus Lifestyle in the Inter-Metropolitan Migration of the Young," *International Journal of Economic Development* 5(3) (June 2003); Steven Malanga, "The Creative Clash," *Governing Magazine* (June 2004); Louis G. Tornatzky et al., *Where Have All the Students Gone? Interstate Migration of Recent Science and Engineering Graduates* (Research Triangle Park, NC: Southern Growth Policies Board, Southern Technology Council, February 1998); and *Graduate Migration from Indiana's Post-Secondary Institutions* (Indianapolis: Indiana's Human Capital Retention Project, Indiana Fiscal Policy Institute (March 1999).

221 Gottlieb and Joseph, "College-to-Work Migration of Technology Graduates and Holders of Doctorates within the United States."

222 This ordering of priorities reflects the basic neoclassical economic principle that individuals seek to maximize utility given certain constraints. For the vast majority of working-age adults, the need to earn a living is a primary constraint, and is therefore the most significant factor in their location decisions. See Michael Storper and Allen Scott, "Rethinking Human Capital, Creativity and Urban Growth."

223 Other factors that influence the location decisions of high-skilled workers on the margins include the education of the incumbent population (i.e., the presence of other knowledge workers), city size (i.e., migration increases with city size), and proximity to where one was born or received the latest degree. Gottlieb and Joseph, "College-to-Work Migration of Technology Graduates and Holders of Doctorates within the United States."

224 See Berry, Bodini and Weissbourd, *Grads and Fads*, 12, 16; and Krugman, *Geography and Trade*, as cited in Cortright, "New Growth Theory, Technology and Learning: A Practitioners Guide," 19-20. As a result of this iterative dynamic, metropolitan areas with higher levels of deployed human capital have an advantage that continues to build on itself. A pattern of divergence is occurring between high- and low-performing regions, both with respect to economic growth and growth in educational attainment. Weissbourd and Berry, *The Changing Dynamics of Urban America*, 22-23. For a review of the economic literature on these topics see, e.g., Edward Glaeser and Albert Saiz, "The Rise of the Skilled City," discussion paper 2025, Harvard Institute of Economic Research, December 2003; and Christopher R. Berry and Edward L. Glaeser, "The Divergence of Human Capital Levels across Cities," discussion paper 2091, Harvard Institute of Economic Research, September 2005.

225 Finally, this shift in emphasis from just human capital production and amenities to the dynamic and iterative deployment process again highlights the importance of employer driven training and enhancing labor market "matching" efficiency, as discussed below.

226 As proxied for by increased wages. See Gueorgui Kambourov and Iourii Manovskii, "Occupational Mobility and Wage Inequality," *Review of Economic Studies* 76(2) (2009): 731-759. Kambourov and Manovskii find that 5 years of tenure in the same occupation increases wages by 12% holding other variables constant.

227 As proxied for by increased wages. See James Heckman, JoraStixrud and Sergio Urzua, "The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior,"*Journal of Labor Economics* 24(3) (2006): 411-482. Heckman et al. finds that except for male 4-year college graduates, the labor market values noncognitive skills (as measured by increased wages) as much as or more than cognitive skills. The magnitude of the effect depends on the specific population of workers in question (i.e., high school graduates, drop outs, some college, female, male, etc.). See also Marigee Bacolod, Bernardo Blum and William Strange, "Skills in the City," *Journal of Urban Economics* 65(2) (2009): 136-153; and Robert Lerman, *Are Skills the Problem? Reforming the Education and Training System in the United States* (Kalamazoo, MI: Upjohn Institute for Employment Research at the Urban Institute, 2008).

228 The 1997 National Employer Survey revealed that employers ranked attitude, communication skills, previous work experience, employer recommendations and industry-based credentials above years of schooling, grades and test scores administered as part of the interview when hiring new employees. The survey included responses from more than 3,300 businesses. National Center on the Educational Quality of the Workforce, *EQW National Employer Survey* (Philadelphia: University of Pennsylvania, 1997).

229 See Lerman, *Are Skills the Problem? Reforming the Education and Training System in the United States*; and Kambourov and Manovskii, "Occupational Mobility and Wage Inequality."

230 See: Eric Knudsen, James Heckman, Judy Cameron, and Jack Shonkoff, "Economic, neurobiological, and behavioral perspectives on building America's future workforce," Proceedings of the National Academy of Sciences 103(27) (2006): 10155-10162.

231 Each additional year of schooling is associated with an 8 to 12 percent increase in individual earnings. See Moretti, "Human Capital Externalities in Cities." The individual returns to schooling increased by as much as 35 to 50 percent between 1985 and 2000. See David Card, "The causal effect of education on earnings," *Handbook of Labor Economics*, 3(1) (1999): 1801-1863.

232 Competitiveness in a globalized economy depends in part on a region's ability to consistently increase the productive use of its own resources, for which upgrading and better leveraging the skills of its workforce (i.e., increasing output per worker) is a critical component. See Michael Kitson, Ron Martin and Peter Tyler, "Regional Competitiveness: An Elusive yet Key Concept?" *Regional Studies* 38(9) (2004): 993.

233 Research indicates that "learning begets learning." The skills established in early childhood and primary education are the foundation on which later, more complex capacities are developed, rendering later investments in skill attainment more efficient and effective. See Knudsen, Heckman, Cameron, and Shonkoff, "Economic, neurobiological, and behavioral perspectives on building America's future workforce."

234 See Clive Belfield, Milagros Nores, Steve Barnett and L.J. Schweinhart, "The High/Scope Perry Preschool Program: Cost-Benefit Analysis Using Data from the Age-40 Followup," *Journal of Human Resources* 41(1) (2006):162-190; A. Reynolds, J. Temple, S. Ou, D. Robertson and J. Merksy, "Effects of a School-Based, Early-Childhood Intervention on Adult Health and Well-being: A 19-Year Follow-up of Low-Income Families," *Archives of Pediatric Adolescent Medicine* 161(8) (2007): 730-739; and F.A. Campbell, C.T. Ramey, E. Pungello, J. Sparling and S. Miller-Johnson, "Early Childhood Education: Young Adult Outcomes from the Abecedarian Project," *Applied Developmental Science* 6(1) (2002): 42-57.

235 Each additional year of schooling is associated with an 8 to 12 percent increase in individual earnings. See Moretti, "Human Capital Externalities in Cities." The individual returns to schooling increased by as much as 35 to 50 percent between 1985 and 2000. See David Card, "The causal effect of education on earnings," *Handbook of Labor Economics*, 3(1) (1999): 1801-1863.

236 In 2006, almost six in ten jobs nationally were held by workers with at least some college or postsecondary training, compared to two in ten in 1959. Between 2006 and 2016, jobs that require either an associate's degree or a post-secondary vocational award are projected to grow faster than jobs that require no postsecondary training and slightly faster than occupations requiring a bachelor's degree or more. See *Preparing the Workers of Today for the Jobs of Tomorrow* (Washington, DC: Executive Office of the President, Council of Economic Advisers, 2009). Link found at http://www.whitehouse.gov/assets/documents/Jobs_of_the_Future.pdf. See also Anthony Carnevale and Donna Desrochers, "The Missing Middle: Aligning Education and the Knowledge Economy," paper prepared by the Educational Testing Service for the Office of Vocational Education, U.S. Department of Education, 2002; and Thomas L. Hungerford and Robert W. Wassmer, *K-12 Education in the U.S. Economy: Its Impact on Economic Development, Earnings, and Housing Values* (Washington, DC: National Education Association, September 2003).

237 See Gottlieb and Joseph, "College-to-Work Migration of Technology Graduates and Holders of Doctorates within the United States." Moretti, "Human Capital Externalities in Cities."; and Berry, Bodini and Weissbourd, *Grads and Fads: The Dynamics of Human Capital Location*, 12.

238 Berry, Bodini and Weissbourd, *Grads and Fads: The Dynamics of Human Capital Location*, 12.

239 Making recommendations about which specific amenities to improve to attract and retain knowledge workers is outside the scope of this paper. Additionally, the migration literature has not reached a consensus on which amenities have the greatest impact on the location decisions of knowledge workers. For further discussion, see, e.g., Edward Glaeser, Jed Kolko and Albert Saiz, "Consumer City," *Journal of Economic Geography* 1(1) (2001): 27-50; Berry, Bodini and Weissbourd, *Grads and Fads: The Dynamics of Human Capital Location*, 14.

240 For a review of labor market search theory, see Dale Mortensen, "Job Search and Labor Market Analysis," in *Handbook of Labor Economics*, ed. O.C. Ashenfelter and R. Layard (Amsterdam: North-Holland, 1986).

241 In the late 1970s, Americans were estimated to have an average of seven employers in their working lifetimes. By 2005, U.S. Bureau of Labor Statistics data indicated that the average American worker born in the later years of the baby boom had 10.5 employers by age 40. See Gina Dokko, Steffanie Wil, and Nancy Rothbard, "Unpacking Prior Experience: How Career History Affects Job Performance," *Organization Science*, 20(1) (2009):51-68. For a discussion of the increasing transaction costs in the labor market more broadly, see Chris Benner, "Labour Flexibility and Regional Development: The Role of Labor Market Intermediaries," *Regional Studies* 37(6&7) (2003): 621-633.

242 For a discussion of the impact of changing trends in job security and tenure, mobility, wages, and career advancement, see Paul Osterman, "Labor Market Intermediaries in the Modern Labor Market," in *Workforce Intermediaries for the 21st Century*, edited by Robert P. Giloth (Philadelphia: Temple University Press, 2003); and Thomas DiPrete, Dominique Goux and Eric Maurin, "Internal Labor Markets and Earnings Trajectories in the Post-Fordist Economy: An Analysis of Recent Trends." *Social Science Research* 31 (2002):175-196. See also Peter Capelli, "Career Jobs are Dead," *California Management Review*, 42(1) (1999): 146- 167, 147, 155-156. Capelli notes a 10 percent increase in the rate of job changes for younger workers in the 1990s than in earlier decades. Of men approaching retirement age (58 to 63), only 29 percent had been with the same employer for 10 years or more compared to a figure of 47 percent in 1969.

243 Corporate expenditures on workforce training as a share of GDP have fallen by almost half in the last fifteen years. "Training Magazine's 2007 Industry Report." Available at: http://www.trainingmag.com/msg/content_display/publications/e3ib4fbcf3a3d03c749c530aa54043278f5. This trend reflects a general disincentive that firms face to invest in the skills of mobile workers. If a firm invests in a worker who then chooses to go elsewhere, the firm does not receive the returns on its investment in the form of increased productivity. Since firms cannot "own" the skills in which they invested, on an aggregate level they will invest less than the societally optimal level of training. (In other words, education and training generally produce positive externalities. As a result, private firms cannot be expected invest at optimal levels, which is a key justification for government funded education.) There's even some indication that individuals who have recently received internal job training are the most likely to leave a company, making employers less likely to sponsor paid, internal training. See, Peter Capelli, "Talent Management for the Twenty-First Century," *Harvard Business Review* (March 2008), 4.

244 To the extent that employers do provide formal skills development, availability of training is disproportionately provided to workers with higher educational levels, meaning that workers with a high school diploma or less receive the lowest amounts of employer-provided training. See Robert Lerman, Signe-Mary McKernan and Stephanie Riegg, *Employer-Provided Training and Public Policy* (Washington, DC: The Urban Institute, 1999); Maureen Conway, *Investigating Demand Side Outcomes: Literature Review and Implications* (Washington, DC: The Aspen Institute, 2003); and Paul Osterman, "Employment and Training Policies: New Directions for Less Skilled Adults" (2007) in *Reshaping the American Workforce in a Changing Economy*, Washington D.C., The Urban Institute Press.

245 See Benner, "Labour Flexibility and Regional Development: The Role of Labor Market Intermediaries."

246 Broadly speaking, labor market intermediaries look both ways in the labor market, attending to the needs and interests of both workers and businesses in facilitating labor market transactions. LMIs consist of a wide variety of organizations, including private sector employment agencies, recruiters and labor contractors; membership-based professional associations, guilds and unions; and public sector programs or educational institutions such as workforce development programs, community colleges or other postsecondary educational institutions, and community or non-profit organizations. See Benner, "Labour Flexibility and Regional Development: The Role of Labor Market Intermediaries."; and Osterman, "Labor Market Intermediaries in the Modern Labor Market."

247 See Weissbourd, "*Into the Economic Mainstream: A Discussion Paper on Bipartisan Policies for Inclusive Economic Growth*."

248 Nearly 1.5 million certificates or credentials were awarded in 2007, up more than 28 percent since 2002. In 2008, nearly one out of two (47 percent) of all undergraduates were enrolled in certificates or associates degree programs. See U.S. Department of Education, "Changes in Postsecondary Awards Below the Bachelor's Degree: 1997 to 2007," NCES 2010-167, November 2009.

249 In 2003, the OECD surveyed adults in several OECD nations to directly measure literacy and numeracy skills. The survey in the United States questioned a random representative sample of 3,400 adults. Five levels were identified, with a level one score signifying very low-level skills. In the United States, 20 percent of adults scored at level one in both prose and document skills, and 26 percent scored at level one in numeracy skills. For comparison, in Canada the fractions at these levels were 14 percent and 19 percent. In Norway they were 7 percent and 10 percent. See "Learning a Living: First Results of the Adult Literacy and Life Skills Survey," Organization for Economic Co-operation and Development, 2005, 50. Available at: http://www.oecd.org/dataoecd/44/7/34867438.pdf.

250 In the *2005 Skills Gap Survey* conducted by Deloitte Consulting and the National Association of Manufacturers, nearly half of responding employers reported that current employees have inadequate basic employability skills such as attendance, timeliness, and work ethic and 36 percent indicated insufficient reading, writing, and communication skills. See Phyllis Eisen, Jerry Jasinowski and Richard Kleinert, "2005 Skills Gap Report-A Survey of the American Manufacturing Workforce," report produced by Deloitte Consulting, National Association of Manufacturers, and the Manufacturing Institute.

251 One prominent example of a foundational skills certification is the ACT National Career Readiness Certificate (NCRC), which was designed to reflect workers' basic skills in reading, math and locating information. For more information on the NCRC, see http://www.act.org/certificate/.

252 Research using data from Florida state indicates that for two-year college students that do not later transfer to four-year colleges, concentrating in health-related fields increases subsequent earnings by over 40 percent relative to students who take courses in the humanities, professional and voc-tech fields by more than 20 percent, and quantitative courses (STEM) by 13 percent, even after controlling for background characteristics. For four-year college graduates, degrees in STEM concentrations are the most lucrative. See Louis Jacobson and Christine Mokher, "Pathways to Boosting the Earnings of Low-Income students by Increasing Their Educational Attainment," prepared for the Bill & Melinda Gates Foundation by the Hudson Institute for Employment Policy and CNA Analysis and Solutions, 2009. Additionally, research using data from Washington state found that among older workers who returned to community college, male workers who took quantitative or industry-focused courses experienced a 10% increase in subsequent earnings, versus only 3 to 5 percent subsequent increased earnings for workers who took all other courses. See Louis Jacobson, Robert LaLonde and Daniel Sullivan, "The Impact of Community College Retraining on Older Displaced Workers: Should We Teach Old Dogs New Tricks?" *Industrial & Labor Relations Review* 58(3) (2005), Article 5.

253 Illustrative of the struggle to find workers with the "right" skills, in a 2005 survey conducted by Deloitte Consulting, 90 percent of responding manufacturers reported a shortage of qualified workers for positions of varying skill levels, and 53 percent indicated that at least 10 percent of their total jobs were currently unfilled for this reason. In addition, nearly half of manufacturing firms surveyed reported having current employees with inadequate basic employability skills, such as attendance, timeliness and work ethic, and 46 percent reported inadequate problem-solving skills. See Eisen, Jasinowski and Kleinert, "2005 Skills Gap Report — A Survey of the American Manufacturing Workforce."

254 See, Summers, "Rescuing and Rebuilding the U.S. Economy: A Progress Report"; "Remarks by the President in the State of the Union Address"; Katz, "The Next Economy: Transforming Energy and Infrastructure Investment"; and "Strengthening the American Labor Force" in *The Economic Report of the President*. (See note 44 for full citations.)

255 See Ben Bernanke "The Level and Distribution of Economic Well-Being." Speech given on February 6, 2007 before the Greater Omaha Chamber of Commerce, Omaha, Nebraska. Available at: http://www.federalreserve.gov/newsevents/speech/bernanke20070206a.htm.

256 Recent research suggests that contrary to popular perception, the United States exhibits less intergenerational income mobility than other OECD countries such as Denmark, Norway, Finland, Canada, Sweden, and Germany to name a few, as measured by how predictive a parents' income levels are of their child's income levels. About half of the difference in income between families in one generation persists into the next. In the U.S., 42 percent of children born to parents in the bottom fifth of the income distribution remain in the bottom, while 39 percent born to parents in the top fifth remain at the top. See Isabel Sawhil and John E. Morton, "Economic Mobility: Is the American Dream Alive and Well?" Report from the Economic Mobility Project of the Brookings Institution, 2008; and Julia Isaacs, Isabel Sawhill and Ron Haskins, "Getting Ahead or Losing Ground: Economic Mobility in America," report for the Economic Mobility Project of the Brookings Institution, 2007.

257 Saurav Dev Bhatta, "Are Inequality and Poverty Harmful for Economic Growth: Evidence from the Metropolitan Areas of the United States," *Journal of Urban Affairs* 23(3-4) (2001): 335-359 (initial poverty rate in 1980 has a statistically significant negative effect on economic growth in U.S. MSAs between 1980 and 1990); Ramaprasad Rajaram, "Poverty, Income Inequality and Economic Growth in U.S. Counties: A Spatial Analysis," Department of Economics at the University of Georgia, 2009 (counties with a higher initial level of poverty in 1979 experienced slower economic growth between 1979 and 1999). See also findings and discussion in Weissbourd and Berry, *"The Changing Dynamics of Urban America."*

258 Note that "middle class" and "middle-skill jobs" no longer equate, raising complex issues beyond the scope of this paper. While middle-skill jobs (i.e., those requiring some postsecondary training but not necessarily a four-year college degree) continue to comprise a greater portion of all jobs in the national economy, wages in the middle of the income distribution (i.e., middle-wage jobs) have stagnated over the last 30 years, posing a question as to whether supporting a "middle class" means ensuring access to middle-skill jobs (on the rise) or middle-wage jobs (on the fall). See Harry J. Holzer and Robert I. Lerman, "The Future of Middle-Skill Jobs," CCF Brief #41, Brookings Institution Center on Children and Families, 2009; "Preparing the Workers of Today for the Jobs of Tomorrow," Executive Office of the President, Council of Economic Advisers; and David Autor, "The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings," Center for American Progress and The Hamilton Project, 2010.

259 Using 1960-2000 state-level data, Partridge (2005) finds that having a vibrant middle class (i.e., middle-class income share) in 1960 increased states' economic growth in the long run. Mark Partridge, "Does Income Distribution Affect U.S. State Economic Growth?" *Journal of Regional Science* 45(2) (2005): 363-394.

260 See Homi Kharas and Geoffrey Gertz, *The New Global Middle Class: A Cross-Over from West to East* (Washington, D.C.: Wolfensen Center for Development at the Brookings Institution, Brookings Institution Press, 2010). It has also been argued that the middle class is good for economic growth because it is a political voting block that favors pro-growth reforms, improved infrastructure and investment in the education system. See William Easterly, "The Middle Class Consensus and Economic Development," *Journal of Economic Growth* 6(4) (2001): 317-335; and Alberto Alesina and DaniRodrick, "Distributive Politics and Economic Growth," *The Quarterly Journal of Economics* 109(2) (1994): 465-490.

261 See Davis Jenkins, *Career Pathways: Aligning Public Resources to Support Individual and Regional Economic Advancement in the Knowledge Economy* (New York: Workforce Strategy Center, 2006); and Davis Jenkins and Christopher Spence, *The Career Pathways How-To Guide* (New York: Workforce Strategy Center, 2006).

262 See Randall Wilson, Kristina Cowan, Ed Phippen and Rebecca Star, *A Primer for Work-Based Learning: How to Make a Job the Basis for a College Education* (Boston: Robert Wood Johnson Foundation, The Hitachi Foundation, and Jobs for the Future, 2008). See also Jeff Landis, "Work-Based Learning Model Helps Community Health Centers 'Grow their Own Workforce': Training Frontline Workers is Focus of the National Jobs to Careers Initiative," press release, August 11, 2010. Available at: http://jobs2careers.org/press_release.php?id=82.

263 For many low-income workers, undergoing extensive training presents both financial and scheduling challenges. It is likely in these cases that workers do not have the financial means necessary to stop working while furthering their education, especially in the case of sole wage earners or caregivers of families. As a result, many "career pathway" programs offer additional supports for enrollees, including child care, financial aid, and career assessment and counseling. Additionally, courses are intentionally scheduled at convenient times and locations for working adults, even at the workplace itself.

264 See Weissbourd and Berry, *The Changing Dynamics of Urban America*, and analysis by The Brookings Institution Urban and Metropolitan Policy Program, using 2008 data from the U.S. Department of Labor, Bureau of Labor Statistics.

265 Analysis by The Brookings Institution Urban and Metropolitan Policy Program, using 2008 data from the U.S. Census Bureau American Community Survey.

266 *Workforce Development Report* (Chicago: Chicago Community Trust, 2009), 47 and *Education Report: Education for the Future in Northeast Illinois* (Chicago: Chicago Community Trust, 2010), 21-22.

267 *Illinois' Forgotten Middle-Skill Jobs* (Washington, DC: The Workforce Alliance, September 2008).

268 The recommendations to improve the P-20 education system are presented in the GO TO 2040 education source report, *Education for the Future in Northeast Illinois*.

269 It is outside the scope of this companion report to assess the impact of specific recommendations for K-12 policies on increasing educational levels. Research cited in the Definition and Significance section indicates that increased access to early childhood education will improve educational attainment levels.

270 In Chicago Community Trust, *Education for the Future in Northeast Illinois*, see recommendation 22: "*College to work force:* Strengthen partner¬ships and collaboration between higher education institutions and professional/business communities in the region to smooth students' transitions to the workforce and careers and to strengthen the sharing of resources across these sectors."

271 As of 1999, more than 200,000 households in the region were "linguistically isolated," meaning that all members over age 13 have some degree of difficulty with English. (2000 US Census, as cited by *Workforce Development Report*, 11).

272 Per *Education for the Future in Northeast Illinois* recommendation 18, "Increase college graduation rates among African American and Latino students to match the rate of white and Asian-American students."

273 Lucas finds an impact of 3.2%, while Rauch finds an impact of 2.8%. Robert E. Lucas, Jr., "On the Mechanics of Economic Development," *Journal of Monetary Economics* 22(1) (1988): 3-42; and Rauch, "Productivity Gains from Geographic Concentration of Human Capital: Evidence from Cities."

274 Sandra E. Black and Lisa M. Lynch, "Human Capital Investments and Productivity," *The American Economic Review* 86 (1996): 264. The authors define "non-manufacturing jobs" as those in private companies with more than 20 employees, excluding public companies, not-for-profit institutions and corporate headquarters.

275 Mincer, *Schooling, Experience, and Earnings*.

276 Further, they find that the quality of K-12 education (as measured, albeit imperfectly, by funding levels) obtained has a significant impact on workers' wages, total employment and small business starts (4). Hungerford and Wassmer, *K-12 Education in the U.S. Economy: Its Impact on Economic Development, Earnings, and Housing Values*, 13-14.

277 Moretti, "Human Capital Externalities in Cities."

278 These include safe, efficient transportation infrastructure and access to public transit (see Chapter V); affordable, mixed-use communities within close proximity to high-quality amenities (e.g., schools, recreation, entertainment, services; see Chapter V); adequate provision and protection of open space (see Chapter VIII); emphasis on energy and water conservation (see Chapters IV and VIII); and availability of locally produced food (see Chapter VIII).

279 These recommendations touch on job creation as a result of strategies to increase firm-level innovation and support growth in the region's most promising clusters, including freight/logistics and energy-efficiency goods and services.

280 North, *Institutions, Institutional Change, and Economic Performance*; see, e.g., discussion in Cortright, "New Growth Theory, Technology and Learning: A Practitioners Guide," 16-17.

281 With respect to the relationship of government and markets, see, e.g., Richard Nelson, Ed., *The Limits of Market Organization* (New York: Russell Sage Foundation, 2005), 15, 161 et al, 213 et al.; Robert Weissbourd, "*Into the Economic Mainstream: A Discussion Paper on Bipartisan Policies for Inclusive Economic Growth*"; and Douglass C. North, *Institutions, Institutional Change, and Economic Performance*.

282 Berry, *Imperfect Union*.

283 Berry, *Imperfect Union*, 1-25 (introduction).

284 Charles Tiebout, "A Pure Theory of Local Expenditures," *The Journal of Political Economy* 64(5) (October 1956): 416-424.

285 It is worth noting that Tiebout's model is in fact more subtle than this characterization. The nuances, however, only strengthen the model's contention that the existence of a larger number of governments increases the efficiency of service provision, insofar as having more communities from which to choose increases the likelihood of multiple communities matching the preference set of any given individual or business.

286 "…moving or failing to move replaces the usual market test of willingness to buy a good and reveals the consumer-voter's demand for public services." Tiebout, "A Pure Theory of Local Expenditures," 418.

287 "…the city manager or elected official who is not able to keep his costs (taxes) low compared with those of similar communities will find himself out of a job." Tiebout, "A Pure Theory of Local Expenditures," 422, footnote 18.

288 Tiebout, "A Pure Theory of Local Expenditures."

289 Paul W. Rhode and Koleman S. Strumpf, "Assessing the Importance of Tiebout Sorting: Local Heterogeneity from 1850 to 1990," *The American Economic Review* 93(4) (December, 2003): 1648-1677.

290 Tiebout, "A Pure Theory of Local Expenditures," 423.

291 "In an attempt to keep taxes low to attract business investment, local officials may hold spending below those levels for which marginal benefits equal marginal costs." Wallace E. Oates, *Fiscal Federalism* (New York: Harcourt Brace Jovanovich, 1972), 143 as quoted in John Douglas Wilson, "Theories of Tax Competition," *National Tax Journal* 52(2) (1999): 269.

292 A good summary of much of this literature can be found in Wilson, "Theories of Tax Competition."

293 For further discussion of this argument, see, e.g., Wallace E. Oates, "Fiscal Competition or Harmonization? Some Reflections," *National Tax Journal* 54(3) (2001): 507-512.

294 Wilson, "Theories of Tax Competition," 269.

295 See, e.g., Paul G. Lewis, "Retail Politics: Local Sales Taxes and the Fiscalization of Land Use," *Economic Development Quarterly* 15 (2001): 21-35 and Michael A. Pagano, "City Fiscal Structures and Land Development," Discussion Paper Prepared for The Brookings Institution Center on Urban and Metropolitan Policy and CEOs for Cities, April 2003.

296 See Sinn's example of social insurance (both conceptual and modeled), which illustrates this concept well, in Hans-Werner Sinn, "The Selection Principle and Market Failure in Systems Competition," *Journal of Public Economics* 66(2) (1997): 264.

297 Berry, *Imperfect Union*, 1 and 179. Berry's book is the most thorough to date in developing a theory of special-purpose government, and provides the basis for the discussion which follows.

298 Berry, *Imperfect Union*, citing Moe, notes that teachers, for example, are far more likely to vote in school board elections than the electorate at large. See Terry M. Moe, "Political Control and the Power of the Agent," *The Journal of Law, Economics and Organization* 22(1) (2006): 1-29.

299 For early discussion of common pool theory in resource economics, see, e.g., Garrett Hardin, "The Tragedy of the Commons," *Science* 162(3859) (1968): 1243-1248.

300 For a detailed discussion, see Berry, *Imperfect Union*, 129-147.

301 It should be noted, however, that from the 1950s through the mid-1970s, researchers overwhelmingly found that tax burdens had no statistically significant impact on economic activity, and some even found higher growth in places with higher taxes. For a thorough review, see Robert G. Lynch, *Rethinking Growth Strategies: How State and Local Taxes and Services Affect Economic Development* (Washington, DC: Economic Policy Institute, 2004).

302 A deadweight loss is the cost created when the market inefficiently allocates resources.

303 It should be noted that most of these studies examine the impact of taxes on "business activity" through indicators such as the employment and location and investment decisions of manufacturers. Bartik notes that manufacturers' orientation to a national market (in which it is more difficult to pass on higher costs of production to customers) and capital intensity may cause their location decisions to be more heavily influenced by tax burden than those of other firms, so that the magnitude of results reported should be viewed with some caution. Timothy Bartik, "The Effects of State and Local Taxes on Economic Development: A Review of Recent Research," *Economic Development Quarterly* 6(1) (February 1992): 105.

304 See, e.g., Bartik, "The Effects of State and Local Taxes on Economic Development."

305 Delving deeper into the 25 studies that control for the quality of public service provision, Bartik finds a mean long-run elasticity of -0.33 and proposes a "plausible range" between -0.15 and -0.51 for the magnitude of tax effects. That is, a 10% increase in taxes would result in a 1.5% to 5.1% decrease in business activity. Applying his findings to a hypothetical policy of cutting taxes to spur job creation, Bartik finds that each new job would cost in foregone revenue "somewhere between $2 thousand and $11 thousand — that is, the costs range from 'expensive but maybe worth it' to 'much too expensive.'" Bartik, "The Effects of State and Local Taxes on Economic Development": 109.

306 Updating Bartik's results to include studies done since 1991, Wasylenko comes to a similar conclusion and suggests an interregional elasticity of growth with respect to taxation of -0.2. Michael Wasylenko, "Taxation and Economic Development: The State of the Economic Literature," *New England Economic Review* (March/April 1997): 37-52.

307 Bartik, "The Effects of State and Local Taxes on Economic Development," 109.

308 See Wasylenko, "Taxation and Economic Development," 43. For additional discussion of measurement difficulties, see William Easterly and Sergio Rebelo, "Fiscal Policy and Economic Growth," Working Paper No. 4499, National Bureau of Economic Research, October 1993, 6-7.

309 Lynch, "*Rethinking Growth Strategies*," 6.

310 Bartik (1992) and Wasylenko (1997) both find that while taxes tend to have a statistically significant impact on inter-regional location decisions, the effect is of a smaller magnitude when comparing locations in different regions rather than locations within the same region.

311 Michael Wasylenko and Therese McGuire, "Jobs and Taxes: The Effect of Business Climate on States' Employment Growth Rates," *National Tax Journal* 38 (1985): 506; and Scott Koeneman, "Property Tax Classification in Cook County, Illinois," *Land Lines* 12(1) (January 2000).

312 See, e.g., meta-analysis of 60 studies in Joseph M. Phillips and Ernest P. Goss, "The Effect of State and Local Taxes on Economic Development: A Meta-Analysis," *Southern Economic Journal* 62(2): 325.

313 Wasylenko, "Taxation and Economic Development," 47.

314 Bartik finds that the average long-run elasticity of a jurisdiction's industrial activity with respect to its property tax rate is -1.76. Bartik, "The Effects of State and Local Taxes on Economic Development," 107.

315 Empirical evidence suggests that, while tax breaks are often a source of bargaining leverage between a jurisdiction and a firm, tax incentives are often a net cost (costs exceed benefits) and divert funding from other public goods (e.g., infrastructure and education). Additionally, anecdotal evidence suggests that incentives "poison inter-jurisdictional relations, contribute to sprawl, favor large businesses over small, strain the planning capacity of local government and are subject to cronyism and abuse." Rachel Weber and David Santacroce, *The Ideal Deal: How Local Governments Can Get More for their Economic Development Dollar* (Chicago: University of Illinois at Chicago, Center for Urban Economic Development, 2007), 1, referencing Greg LeRoy, *The Great American Jobs Scam: Corporate Tax Dodging and the Myth of Job Creation* (San Francisco: Berrett Koehler, 2005).

316 Typical statistical models look at the effect of taxes "holding all else equal," which does not really address the relevant question. If taxes fund services, we do not want to hold service levels constant, but rather we want to know the effect of taxes, net of the (presumably) positive effects of the services they generate. On this score, for example, Lynch finds that "there is no evidence that state and local tax cuts, when paid for by reducing public services, stimulate economic activity." Robert G. Lynch, "The Effectiveness of State and Local Tax Cuts and Incentives: A Review of the Literature," *State Tax Notes* (September 30, 1996): 949-953.

317 Daniel Luria and Joel Rogers, "Manufacturing, Regional Prosperity and Public Policy," in *Retooling for Growth: Building a 21st Century Economy in America's Older Industrial Areas*, ed. Richard M. McGahey and Jennifer S. Vey (Washington, D.C.: Brookings Institution Press, 2008), 263.

318 In a review of the literature, Bartik finds that 15 out of 26 studies identify at least one positive and statistically significant public service variable coefficient on state and local business growth. The most often-cited goods/amenities contributing to firms' decisions include quality of transportation and other infrastructure, schools and public safety services. Bartik, "The Effects of State and Local Taxes on Economic Development," 107. In analysis of annual data collected from 48 states over a 15-year period, Helms finds that financing of goods and services such as public health, highways and education, "may more than counterbalance" the negative effect of the taxes themselves. L. Jay Helms, "The Effect of State and Local Taxes on Economic Development: A Time Series-Cross Section Approach," *The Review of Economics and Statistics* 67(4) (November 1985): 575. Further, a 2009 survey from the Illinois Chamber of Commerce revealed that, when asked what firms considered to be the most important factors in final site selection decisions, five factors were identified by about 40% of the respondents: transportation infrastructure (40%), availability of employees (40%), location characteristics (39%), land/building availability (38%) and costs of doing business (38%). *Opportunities and Challenges of Doing Business in Illinois: A Survey of Illinois Commercial and Industrial Real Estate Agents and Brokers* (Springfield and Chicago: Illinois Chamber of Commerce, 2009), 2.

319 See "What Does a High-Road Region Look Like" in Luria and Rogers, "Manufacturing, Regional Prosperity and Public Policy," 263-267.

320 For a good overview of these studies, see Lynch, "*Rethinking Growth Strategies*."

321 For discussion of the role of information in market functions, see Robert Weissbourd and Riccardo Bodini, *Market-Based Community Economic Development* (Washington, DC: Brookings Institution Metropolitan Policy Program, March 2005) and Weissbourd and Bodini, *Using Information Resources to Enhance Urban Markets* (Washington, DC: Brookings Institution Metropolitan Policy Program, March 2005).

322 Thoughtful consideration of the implications of this observation predates the emergence of information economics as a recognized subfield within the discipline. See, for example, F.H. Hayek, "The Use of Knowledge in Society," *The American Economic Review* 35(4) (September 1945): 519-530.

323 Because the primary cost of search is time, buyers with higher incomes will spend less time searching (or require greater price dispersion to engage in incrementally more searching).

324 This example is drawn from George Stigler, "The Economics of Information," *The Journal of Political Economy* 69(3) (June 1961): 213-225 and from Steven Solop and Joseph Stiglitz, "Bargains and Ripoffs: A Model of Monopolistically Competitive Price Dispersion," *The Review of Economic Studies* 44(3) (October 1977): 493-510.

325 The seminal work on the topic is George A. Akerlof, "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism," *The Quarterly Journal of Economics* 84(3) (August 1970): 488-500.

326 See, e.g., Richard J. Arnott and Joseph E. Stiglitz, "Labor Turnover, Wage Structures, and Moral Hazard: The Inefficiency of Competitive Markets," *Journal of Labor Economics* 3(4) (October 1985): 434-462 and Joseph Stiglitz and A. Weiss, "Credit Rationing in Markets with Imperfect Information," American Economic Review 71(3) (June 1981): 393-410. A related yet distinct result of the presence of asymmetric information among market participants is the well-known phenomenon of moral hazard. In the context of regional economic growth, moral hazard has been applied to both labor markets, where workers are only as productive as they must be to maintain their current wages; and capital markets, where the interest rate on loans influences borrowers' risk-taking.

327 See, Weissbourd and Bodini, *Market-Based Community Economic Development* and Weissbourd and Bodini, *Using Information Resources to Enhance Urban Markets*. The consumer-side example is drawn from the latter of these.

328 For detailed examples, see, *Valuing Neighborhoods, Driving Change* (Washington, DC and Chicago: Brookings Institution Center on Urban and Metropolitan Policy and RW Ventures, LLC, 2002); Robert Weissbourd, *The Market Potential of Inner City Neighborhoods: Filling the Information Gap* (Washington, DC: The Brookings Institution, 1999); and Weissbourd and Bodini, *Using Information Resources to Enhance Urban Markets*.

329 Further, the broader, 14-county Chicago-Naperville-Joliet, IL-IN-WI Metropolitan Statistical Area (MSA) is home to 1,356 local governments (general and special purpose), the highest of the nation's 100 largest metro areas (the New York City metro area ranks second with 988). "Public Finance Issues in the Chicago Metropolitan Area: Existing Conditions, Policy Analysis, and Other Issues of Significance," unpublished draft, Chicago Metropolitan Agency for Planning, August 12, 2009, 10; and analysis by The Brookings Institution Metropolitan Policy Program, using data from the U.S. Census Bureau Census of Governments Integrated Governments Directory, 2007 Edition.

330 Figures are for the 14-county Chicago-Naperville-Joliet, IL-IN-WI Metropolitan Statistical Area. Data compiled by The Brookings Institution Metropolitan Policy Program using data from the U.S. Census Bureau Census of Governments Integrated Governments Directory, 2007 Edition.

331 For example, the general merchandise sales tax in the City of Chicago is 9.75% as of July 1, 2010. This is the highest among large U.S. cities (the highest overall rate is 12% in Arab, Alabama) and equal to the rate in the City of Los Angeles. *Selected Consumer Taxes in the City of Chicago* (Chicago: The Civic Federation, December 18, 2009), available at http://civicfed.org/sites/default/files/Selected%20Consumer%20Chicago%20Taxes%2012-09.pdf; and William P. Barrett, "U.S. Sales Tax Rates Hit Record High," *Forbes.com* on *MSNBC.com*, March 12, 2010, available at http://www.msnbc.msn.com/id/35822798/.

332 See discussion of challenges related to characteristics of the sales, property and income tax systems identified in GO TO 2040, Chapter 7.

333 For legislation, see http://www.ilga.gov/legislation/publicacts/96/096-0542.htm.

334 A leading national example of a website providing both rich data and robust analytical tools is Policy Map (http://www.policymap.com/), a product of The Reinvestment Fund (http://www.trfund.com/).

335 See, for example, IdeaCrossing, a product of JumpStart, one of the leading facilitators of innovation and entrepreneurship: https://www.ideacrossing.org/.

336 See, e.g., the John D. and Catherine T. MacArthur Foundation's Network on Building Resilient Regions, housed at the University of California-Berkeley's Institute of Governmental Studies (http://brr.berkeley.edu/).

337 Todd Swanstrom, Karen Chapple and Dan Immergluck, *Regional Resilience in the Face of Foreclosures: Evidence from Six Metropolitan Areas* (Berkeley, CA: MacArthur Foundation Research Network on Building Resilient Regions, May 27, 2009), 3-4.

338 Karen Chapple and Bill Lester, *Emerging Patterns of Regional Resilience* (Berkeley, CA: MacArthur Foundation Research Network on Building Resilient Regions, January 2007), 10-11.

339 Susan Christopherson, Jonathan Michie and Peter Tyler, "Regional Resilience: Theoretical and Empirical Perspectives," *Cambridge Journal of Regions, Economy and Society* 3 (2010): 6-7.

340 Research on food transportation patterns indicates that the typical produce item travels 1,500 miles from farm to plate. Multiple-ingredient food products can have even greater distances behind them — the ingredients in a container of strawberry yogurt purchased in Des Moines, IA, for example, have traveled a total of 2,216 miles between them before reaching the eater's spoon. Rich Pirog and Andrew Benjamin, *Calculating Food Miles for a Multiple Ingredient Food Product* (Ames, IA: Leopold Center for Sustainable Agriculture, Iowa State University, 2005).

341 Most sectors are dominated by four or fewer firms. David A. Domina and C. Robert Taylor, *The Debilitating Effects of Concentration in Markets Affecting Agriculture* (Lincoln, NE: Organization for Competitive Markets, 2009).

342 See, e.g., Michael Pollan, "The Vegetable-Industrial Complex," *The New York Times*, October 15, 2006; Marke Winne, *Examining the Roots of Food Insecurity…and Local Solutions for Creating True Food Security* (Kutztown, PA: Rodale Institute, February 3, 2003); and "Policy Statement on Food and Agriculture Security," National Association of State Departments of Agriculture, last updated February 8, 2010, available at http://www.nasda.org/cms/7196/9017/9398.aspx.

343 Lewis, "Retail Politics: Local Sales Taxes and the Fiscalization of Land Use," 21.

344 Iris Lav, *Will Taxing Additional Services Hurt Iowa's Economy?* (Washington, DC: Center on Budget and Policy Priorities, 2004).

345 Pagano, "City Fiscal Structures and Land Development," 4-5. For example, data collected from the National League of Cities' 2002 fiscal conditions survey showed that the average year-to-year growth rate of aggregate sales tax collections for cities' general funds averaged 6.5% from 1995 to 2000, but once the downturn hit, sales tax revenue dropped 2.3% in a single year. In contrast, property taxes across the same six-year period increased 5% and were expected to remain at strong levels throughout the duration of the downturn.

346 Katherine Barrett and Richard Greene, "Growth and Taxes," *Governing Magazine* (January 2008).

347 If Chicagoans take minor everyday actions to make buildings more energy efficient, they can accrue annual cost savings up to $307. *Chicago Climate Action Plan*, 49. Under CNT's "reinvest" scenario, if an average household reduces consumption of natural gas by 287 therms and the consumption of electricity by 2,419 kWh, a household unit can accrue an average annual cost savings of $544. *Chicago Regional Energy Snapshot: Profile and Strategy Analysis* (Chicago: CNT Energy, September 2009), 36. Many other non-Chicago studies confirm the cost savings that can result from energy and water efficiency efforts, including D. Piementel et al. *U.S. Energy Conservation and Efficiency* (Ithaca, NY: Cornell University, 2002); Jonathan G. Koomey et al., "Costs of Reducing Carbon Emissions: U.S. Building Sector Scenarios," *Energy Policy* 26(5) (1998): 438-439; and Transforming Water: Water Efficiency as Stimulus and Long-Term Investment (Chicago: Alliance for Water Efficiency, December 2008).

348 George Tolley, Gundars Rudzitis, and Brett Baden, "Regional Economic Theory, Immigration, and the Influence of Amenities," (presented at the American Real Estate and Urban Economics Association Annual Meetings, January 8, 2008), 6 and 32.

349 For example, a 1999 study by the Urban Land Institute found that homebuyers were willing to pay a $20,000 premium for homes in pedestrian-friendly communities compared to similar houses in other surrounding areas. M. Eppli and C. Tu, *Valuing the New Urbanism: the Impact of New Urbanism on Prices of Single Family Homes* (Washington, DC: Urban Land Institute, 1999), as cited in *The Economic Benefits of Walkable Communities* (Sacramento, CA: Local Government Commission and Center for Livable Communities, 2008), 1.

350 Arrington finds that the assessed value of properties close to public transit increased nationwide from 1980 to 1991 by an average of 67.5%, evidencing the economic value placed on proximity to public transit systems. In some metropolitan areas, the assessed value of similar proximal properties well exceeded this nationwide average, rising by nearly 400%. G. Arrington, Jr., *Beyond the Field of Dreams: Light Rail and Growth Management in Portland* (Portland, OR: Tri-Met, March 1995), 9-10. A study by Litman revealed communities made more pedestrian-friendly via traffic restraints (reducing volumes on residential streets by several hundred cars per day) increased local home values by approximately 18%. Todd Litman, *Evaluating Traffic Calming Benefits: Costs and Equity Impacts* (Victoria, BC: Victoria Transport Policy Institute, 1999), 17.

351 *Defining New Limits: Emerging Trends in Real Estate* (New York and Chicago: ERE Yarmouth and Real Estate Research Corporation, 1998), as cited in *The Economic Benefits of Walkable Communities*, 1.

352 Douglas B. Diamond, "The Relationship Between Amenities and Urban Land Prices," *Land Economics* 56(1) (1980): 29.

353 Chris Walker, *The Public Value of Urban Parks* (Washington, DC: The Urban Institute, 2004), 4.

354 See, for example, Gayatri Acharya and Lynne Lewis Bennett, "Valuing Open Space and Land-Use Patterns in Urban Watersheds," *Journal of Real Estate Finance and Economics* 22(2-3) (2001): 231-233; Andrew R. Miller, "Valuing Open Space: Land Economics and Neighborhood Parks," master's thesis, Massachusetts Institute of Technology Center for Real Estate, 2001, 76; and Greg Lindsey et al. "Property Values, Recreation Values, and Urban Greenways," *Journal of Park and Recreation Administration*, 22 (3) (2004): 81-84. Acharya and Bennett find that in an urban Connecticut watershed, the percentage of open space in a locality's land use pattern was a significant determinant of local property values. Miller examined 14 parks in the Dallas-area and found that homes facing these parks were worth 22% more than homes more than one half mile from this green space. Lindsey et al. examined home sale prices throughout Indianapolis, finding that a location within a half mile of a greenway had a significant, positive effect on sale price, accounting for 15% of average sale price.

355 Anne C. Bellows, Katherine Brown and Jac Smit, *Health Benefits of Urban Agriculture* (Portland, OR: Community Food Security Coalition, 2004), 5.

356 Jules Pretty, "Some Benefits and Drawbacks of Local Food Systems," briefing note for the AgriFood Network, November 2001. Local food systems may also promote community livability through provision of consumer cost savings. In a study comparing the price of locally grown and non-locally grown foods in Iowa's metropolitan areas, Pirog and McCann found that the prices of locally grown foods are often less expensive than non-locally grown products, making the total cost of vegetable consumption, for example, less costly when locally produced foods are a viable option for consumers. Richard Pirog and Nick McCann, *Is Local Food More Expensive? A Consumer Price Perspective on Local and Non-Local Foods Purchased in Iowa* (Ames, IA: Leopold Center for Sustainable Agriculture, Iowa State University, December 2009), 5-10 and 13.

357 Among the 100 largest U.S. metro areas, Chicago ranks 41st on patents per 10,000 employees; 95th on mid-size (20-499 employees) firms per 10,000 employees; 55th in business churn (the sum of firm births and deaths as a percent of total firms); and 77th in employment growth (2002-2008). The region also ranks 2nd in person-hours of traffic delays and 3rd in travel time index (per the Texas Transportation Institute, see footnote 176). Data compiled for the 14-county Chicago-Naperville-Joliet, IL-IN-WI Metropolitan Statistical Area (MSA) by The Brookings Institution Metropolitan Policy Program from various national sources.

Images courtesy of the Chicago Metropolitan Agency for Planning (CMAP).

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