THE CITY AS A SOCIO-TECHNOLOGICAL SITE: THE CASE OF EXCHANGES IN FINANCIAL CENTERS

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Summary

This study suggests that specific urban spaces—such as exchanges and financial centers—considered as spaces of social interaction and connectivity operating within wider economic spaces and markets generate trust, permit solution of collective action problems, and are economically consequential. The creation of markets is made possible by places of dense social interaction and connectivity. These social connectivities don't

follow an impersonal and delocalized logic: the market's invisible hand writ global. Urban spaces such as markets and exchanges are embedded and thus can be cultures and moral communities in which collective action problems can be solved. Yet the growing cognitive and technical complexity of economic space implies that technology and knowledge are crucial to the creation of financial centers and exchanges: material means of calculation and the city as a technological site have become constitutive of economic and social action, and knowledge has become performative; that is, knowledge does not describe an already existing external economy, but brings that economy into being: economic knowledge performs the economy, creating the phenomena it describes. Thus, in studying urban spaces such as markets and exchanges, classic themes in economic sociology, such as the social embedding of markets, need to be combined with challenging recent theoretical contributions to economic sociology such as the performativity of knowledge. Markets along with cities have become techno-systems in which roles previously played by human beings have increasingly been mechanized and in which relations between human beings are increasingly mediated by automated systems. It could be quite mistaken to assume that such technologies simply facilitate and speed up essentially unchanged market relations. We will examine briefly a spectrum of market forms and argue that social connectivities can be found in markets of all kinds, and that these markets are not places of individual, calculative self-interest.

1. Introduction: Innovations in Social Time

The city as a technological site becomes in our account a space for the generation of innovations in social time and therefore a site for the manufacturing and experiencing of uncertainty and risk. Examples of risk abound in a variety of arenas and experiences as Beck points out in his study (1992). Yet, little has been said about the role of risk in today's technological city and culture. What is the position of risk in the global information culture and in the network society? The city as a technological networked site constructs open-ended futures. It connects time and risk. There is a distinctive time-risk dynamics that textures the context of the city. This paper will start to examine this distinctive time-risk relationship at work in the city by looking briefly at how a changing temporal context started to develop at the turn of this century with the standardization and globalization of time and with the establishment of a global present.

The Global Rationalization of Time

Around 1883 Greenwich was installed as the 0 Meridian, and the earth divided into 24 equal time zones, each one hour apart. This standard time brought to an end the myriad of contextual times and dates used by the diverse peoples of the world. In 1913 clock time became synchronized across the globe. Wireless signals from the Eiffel Tower, traveling at near the speed of light, displaced variable local times and imposed instead one uniform, hegemonic world time for all as Adams points out in her study (1998). The restructuring of the very dimensions of time and space required new technological and organizational innovations that compressed the time taken to travel across, and to communicate over, large distances. In addition to the development of Greenwich Mean Time other related innovations that changed these dimensions of time-space also included the telegram, the telephone, steamship travel, the bicycle, cars and lorries, skyscrapers, aircraft, the mass production factory, and X-ray machines. Together they

had the effect of compressing time and space. These developments rationalized time and separated it from local contexts and conditions: one hour became one hour irrespective of season, time of day and place. Both facilitated global synchronization as well as certainty and predictability in socio-economic interactions.

The global present

Today something similar seems to be occurring. New technologies are producing global times in which distances between places and peoples again seem to be dramatically reducing, redrawing the very categories of time and space. Time and space are de-materializing. These innovations in social time facilitate the path to the contemporary global network of economic, socio-cultural, political activities and their transnational networks of global polycentric city-regions. This polycentrism that denotes the existence of multiple centers of calculation in one or in several interconnected areas seems to have become one of the defining characteristics of the contemporary urban landscape. An invisible network of global satellites facilitates the speed intensity and instantaneity with which information can be transferred. In conjunction with the world-wide net of wireless and electronic communication and the merging of computers, telephones and television, instant information has collapsed time into a singular communicative environment: a single global present of interactive instantaneity. International media and data industries bring us news from every time-zone encouraging us to move from a social present to the simultaneity of a global present, a web of networked relations where distant events become immediate. This capacity for enormous speed coupled with multiple connections means that simultaneity and instantaneity together with uncertainty and risk become one of the main characteristics of contemporary time.

The futures industry, financial services institutions, their major international financial futures exchanges and markets, and the risk management services that they support, are all interesting parts of the financial world to study, revealing many of the most potent features of globalization: time/space compression; uncertainty and complexity; the intensification of relationships between global and local. World financial and capital markets operating on a global scale and their twenty-four hour economies operating in electronically and instantaneously linked exchanges which are located in the major financial centers of the world would seem to be the ultimate example of the collapse of time into a dense present moment. Information and communication technologies instantly connect market participants to exchanges in a range of time zones and cities and plug them into an array of simultaneous data services. These networks of major international business centers constitute new centers of calculation. These networks bind the major international financial and business centers: New York, London, Tokyo, Paris, Frankfurt, Zurich, Amsterdam, Los Angeles, Sydney, Hong Kong, among others. But these networks also include cities such as Bangkok, Seoul, Taipei, Sao Paulo, Mexico City. What are the implications of these developments for market sociality?

The creation of these markets for the management of time and risk is made possible by places of dense *social* interaction and connectivity. Our study builds upon the insights of the sociology of economics and the ideas that the social structure of a market is not epiphenomenal to economic action, but constitutive of it; the complementary ideas that

markets are also cultures; that markets are places of political action; and those markets, as Granovetter has argued (1985), are moral communities, articulating with moral concerns.

We will contribute to this current economic sociology by placing emphasis on the roles of time and technology in the economy and in markets. Markets have been increasingly technologized, both internally and in their relation to other markets. Along with cities they have become techno-systems in which roles previously played by human beings have increasingly been mechanized and in which relations between human beings, as well as being conducted by voice and gesture, are increasingly mediated by automated systems. It could be quite mistaken to assume that such technologies simply facilitate and speed up essentially unchanged market relations. Investors who watch a stock ticker, or near real-time prices on electronic screens, may behave quite differently, may stand in different relations to financial markets, than those who act on the basis of word-of-mouth information, newspapers, or newsletters.

It is important to develop a theoretical perspective that would help us understand the emergence of e-strategies at major international financial futures exchanges. We will examine briefly a spectrum of market forms, and argue that social connectivities can be found in markets of all kinds, and that these markets are not places of individual, calculative self-interest. Yet, though sociality may continue in technology-mediated trading, its forms do differ from those in open outcry. They are not characterized by standard sociological notions such as mutual susceptibility and imitation, neither are they local, limited in time and space essentially to the span of face-to-face interaction. Knowledge and technology are important matters for social connectivity in these techno-markets. As markets transform into spaces, rather than places, knowledge management and the maintenance of market communities and market sociability will become important issues. Thus, the question remains as to how connectivity and integration of global spaces and markets as social forms are achieved; whether networks are the only global forms of integration, or whether temporal coordination and the reciprocal interlocking of time dimensions among actors constituted as observers play an even bigger role in the absence of spatial immediacy, if a phenomenon such as inter-subjectivity is to obtain.

In studying high-modern urban spaces such as financial centers and high-modern markets one cannot satisfactorily treat simply as black boxes the technical infrastructure of those markets. These infrastructures cannot be treated as engineering devices whose internal structure can be disregarded. Not to examine the contents of these black boxes is to miss a critical part of how societies are constructed. We propose to start to open this black box by researching the city as technological site, that is, by investigating its spaces of centrality as material means of calculating risk as well as by addressing the processes of social innovation of social time that occur in cities.

The city and its high velocity networked spaces is an organism for the generation of temporal innovations of social time and therefore a site for the manufacturing of uncertainty and risk. These networked cities and their technologies are producing global times. An interesting case of these technological and high velocity environments is financial and capital markets. The connectivity of the financial markets means that

events in one market can sometimes influence those in another, thousands of miles distant, in seconds. Risk can now transcend time and space, making it more menacing in nature and making the timeframe in which organizations must respond more uncertain. Financial markets identify, create, manage, quantify, and distribute risk through connectivity, technology and knowledge. The risk management services that these high speed environments support are centered upon increasingly abstract, informational products derived from the cash markets. Derivative informational products are designed to rationally manage risky futures and expire at a given time. Market participants trade promises to buy or sell at a future time based upon reflexively constituted and rapidly changing knowledge about the present.

We would argue that it is only when instantaneous homogeneous time-spaces of manageable risk are identified and created, through centers of calculations and their material means for calculating, that control over a long distance is possible. Global manufacturing and financial corporations, derivative and financial markets are crucial engines of globalization, but of a specific form of globalization: one in which the key coordinating mechanisms are such markets. Thus, if it is so that a new urbanism is emerging characterized by an upsurge of interest in, and revalorization of, mobility, then understanding this mobility of money, information, people and objects, as it occurs through networked cities and their high velocity environments, is vital.

2. Technological Sites as Centers of Calculation

The city as a technological site is a node in a network of centers of calculation. It is a site where inscriptions (or all the types of transformations through which an entity becomes materialized into a sign, an archive, a document, a piece of paper, or a trace) are combined to make possible certain types of calculation. A centre of calculation can also be a laboratory, a statistical institution, a data bank, and so forth. Thus centrality is being reconfigured: the Central Business District (CBD) of the city is today but one form of centrality of calculation. Important emerging spaces for the constitution of centers of calculation include new transnational networks of cities as well as electronic exchanges and spaces. How do these networks of centers of calculation technically contain and reproduce risk? Let us explore this question by briefly looking at the following three cases: the case of the modern corporation, the case of emerging markets and the case of financial corporations.

2.1. Centers of Calculation Create Spatial Groupings for the Management of Risk

How does the modern corporation manage risk? Firms world-wide have affiliates outside their home countries. Such dispersed factories and service outlets that are part of a firm's integrated operation create new needs for co-ordination and services. It has been argued that the emergence of the global city is mainly a result of the growing complexity of big corporations, as their operations become dispersed around the globe. In the face of mounting intricacies of co-ordination and control, companies increasingly outsource central functions to specialized service firms. Such specialized firms—in law, accounting, finance and so on—need to draw on a huge pool of talent, expertise and information, most readily found in large cities. As leading scholars such as Sassen (1991) and Castells (1996) have argued, global cities are, in this regard, production sites

for the leading information industries of our time. The rich body of research on global cities does not tell us how connectivity and integration of global spaces as social forms are really achieved. How are global forms of integration constructed? To elaborate on this question the author proposes to start to open this *black-box* by means of the following hypothesis: that it is the manufacturing of uncertainty risk and time through fragments of cities re-conceptualized as nodes in networked centers of calculation that enables the modern corporation to function and coordinate its activities on a global scale. This can be observed in both manufacturing and finance. Yet these two main protagonists of an industrial system relate differently to the uncertain future; these actors do not occupy the same risk position.

2.2. The Case of Global Manufacturing Corporations: Mapping Homogeneous Groups

Tribes of Consumers

Global manufacturing corporations pinpoint markets and sources of reliable cheap labor almost anywhere on the planet. They can take their custom anywhere in the world, that is, wherever they can secure the best deal for themselves: for a global operation there is always summer somewhere and always one producer willing and able to outbid the rest. Indeed, what makes global corporations different from multinational corporations is their ability through classificatory boundaries to pinpoint homogenous groupings on a global scale rather than a national one. As Knight has pointed out (1921) the distinction between risk and uncertainty is dependent on the identification of the different conceptual elements necessary to the task of risk management: namely, *classificatory boundaries* that enable sampling; *knowledge* that allows for the organization of information and data; and the *organizational* configuration of those assigned the functions of risk analysis. It is this identification of the three core elements that makes possible the management of risk in modern institutions.

Through the operations of centers of calculation, global corporations then create a homogeneous space and new tribes of consumers for the management of risk. The manufacture of a product can be part of a profit chain that snakes across the globe, benefiting from productivity and cost advantages and unimpeded by the limitations of national regulation. Marketing (especially association marketing) creates vast new tribes of consumers who follow labels, like Gucci and Prada, which represent the same images the world over. Thus rather than thinking about observations, centers of calculation think about data and see people as populations rather than as individuals. Rem Koolhaas and his Office for Metropolitan Architecture (OMA) are working on new buildings for Prada in New York, San Francisco, and Los Angeles. There are already scores of Prada stores, but the Italian fashion company wants to experiment with new environments for these new tribes of consumers that can enhance the appeal of its brand. Mere labels, which are easily counterfeited, are not powerful enough to guarantee authenticity. Popular styles are also quickly duplicated. What can fashion mean when all looks are available at all prices instantly? OMA's answer to that question involves stores that are beautiful public spaces offering local benefits - and are largely free from labels. The Los Angeles Prada will have no name on it; New York's will incorporate cultural activities separate from the retail areas. Anybody can rip off a look, but a highly specific environment that offers something to the public without imposing a sales pitch—in

other words, a local landmark—is a way to make a brand seem more substantial.

These groupings don't map naturally onto the bounded region of the nation state or the city. The spaces of these homogenous populations or groupings do not relate to their social institutions. They are identified—even created—by the modern corporate enterprise so that it can derive its profit from manageable risks.

The global corporation is given the largest conceivable group of instances (e.g. consumers) to identify a known distribution of outcomes, and so has the greatest available flexibility to weave its own profits. It is when these homogeneous spaces of manageable risk are identified and created through these centers of calculation that control over a long distance is possible.

What makes globalization possible is the identification and creation of risk. The guarantees of the stability of the market shift from the legal-political and moral institutions which are unavoidably restricted to a local or national level, to the standardization of market processes themselves which in principle are not subject to local limitations. We now turn briefly to this.

2.3. The Case of Creating Emerging Markets as Homogeneous Groupings for the Management of Risk

2.3.1. Translating Uncertain Societies into Managed Risk

The enormous growth of the emerging markets sector has been based upon the translation on the part of global financial corporations of what was uncertain (e.g. in the distant tiger economies of the Far East, and Central and Eastern Europe) into managed risk investment portfolios that could be sold to investors and Pension Funds.

These societies used to be understood as characterized by uncertainty, that is, as situations in which the distribution of the outcome in a group of instances was not known because it was impossible to form a group of instances, as a result of the fact that the situation dealt with was in a high degree unique. Such significant irregularities could destabilize and so undermine the assumptions of uniformity in an economy and undermine its risk rating.

Yet with the translation of these economies into known distributions of outcomes and the creation of homogeneous groupings by the actions of centers of calculation and their private sector experts—such as market researchers, and most importantly risk-rating agencies—unmanageable uncertainty becomes manageable risk.

In addition to this market, valuation firms, business financial gurus and leading central bankers as well as international financial institutions may also induce market appreciation or depreciation for securities, currencies and whole national economies by upgrading/downgrading their value.

Unmanageable uncertainties are then translated into manageable risks. These private sector risk profiling corporations establish what a good risk is and what is not,

surpassing the importance of the nation-state in economic governance. This undermining of the nation-state represents the reorganization of who defines the basics of the market and of who referees the level playing field upon which enterprises compete. Central to this move is a belief in the efficiency and morality of the free market. Risk is here understood as a tool for engendering profit, or an exercise in the application of modern rationality. Converting uncertainty into risk is easier with computers which can run vast and sophisticated calculations of probabilities. Information technology allows unique information to be channeled more effectively to the relevant experts to convert uncertainty into manageable risk, and modern communications facilitate the coordination of activities all over the world. Actors and institutions are expected to make rational calculations in relation to clearly defined functions against which they are judged.

These actors, together with hedge funds, investors of all kinds, and online transactions, are also factors in generating interconnection between financial markets and thus in introducing information turbulences in global financial markets. It is then through forms of knowledge such as the modeling through mathematics, statistics, and calculus of unpredictable patterns, that the turbulences and uncertainties introduced by these very same actors can be tamed and turned into profit. These actors' belief in their ability to identify and make new markets, to translate irregularities into manageable risks and to organize profit across the world, shows that risk makes globalization possible. When risk is understood in this way, the uncertainties of globalization are conquerable through calculation, and transformed from threats into opportunities. So all-embracing is the belief in the efficacy of these forms of knowledge that quantify risks that, when they are exploited or become destabilized, the effects can be catastrophic.

The connectivity of the financial markets means that events in one market can sometimes influence those in others in seconds. The attitude of global investors to a country's bonds—and, specifically, the rating of those bonds by agencies such as Standard & Poors and Moodys—is a critical matter. For emerging economies such as Indonesia, Argentina or Russia, they can, via their effect on economic circumstances and government budgets, become literally matters of life and death. Thus, because the consequences of financial connectivities are often experienced as an external coercive force, it is easy to imagine that those connectivities follow an impersonal and delocalized logic: the market's invisible hand writ global. That this is partly true cannot be denied. However, global financial connectivities have local aspects: local in the sense that they involve interaction between relatively limited numbers of people who are in some sense known to each other, or at least the effects of whose actions are known. These connectivities are social in nature, and they are economically consequential. In what follows, this paper will look briefly at the easiest context within which to demonstrate the local, social, nature of behavior in financial markets: markets in which trading takes place face-to-face. Economically consequential social connectivities may also be present in markets in which trading takes place by telephone or by electronic intermediation as well as in markets where the identities of the partners to a trade are unknown. Yet these connectivities are of a different kind than those found in open outcry trading. It is to this to which we now turn.

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Bibliography

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Beck, U. (1992) *Risk Society: Towards a New Modernity*, Sage. London. [Beck uses risk as a metaphor to describe positive and negative opportunities engendered by the perceived obligation to actively construct 'tightrope biographies' in the midst of detraditionalization, and the chronic revision of expert claims. He critiques the use of rational-calculative tools and policies to control increasingly chaotic, globalizing phenomenon (from markets to pollution). Adam and Beck maintain that we need to move beyond stagnant industrial society recipes to highlight the creativity of the implicated participant, of the embedded, embodied maker of uncertain and unknowable global futures.]

Callon, M. (Ed.). (1998).*The Laws of the Markets*. Blackwell. Oxford. [The most challenging recent theoretical contribution to economic sociology is Callon's assertion of the performativity of economics. For Callon the economy is embedded not in society but in economics. Economics does not describe an already existing external economy, but brings that economy into being: economics *performs* the economy, creating the phenomena it describes. Sociology, Callon argues, is wrong to try to enrich economics's calculative, self-interested agents. Such agents do exist, he suggests; sociology's goal should be to understand how they are produced, and he claims that economics is key to their production. Performativity, however, has limits, and an emphasis on it needs to be combined with classic themes in economic sociology, such as Granovetterian embedding and the way in which exchanges can be cultures and moral communities in which collective action problems can be solved.]

Castells M (1996) *The Rise of the Network Society*, Blackwell, Oxford. [In the field of globalization and world cities the idea of networks advanced by Castells has been particularly influential. Castells defines globalization as a network society constituted across space as a myriad of linkages, connections and relations—a space of flows—which represents the new spatial logic of the informational age. For Castells, cities now accumulate and retain wealth and power because of what flows through them (information, knowledge, money and cultural practices, for example). The theoretical background for conceptualizing world city networks and the intense connections between cities in terms of transatlantic commuters could be the theory provided by Castells. He argues for a progressive networked urbanism, and a critical urbanism of the networked city. An important limitation of Castells work is his totalizing and unidirectional discourse that sees globalization as transforming the economies and societies of the world into a single network society.]

Granovetter, M.(1985). "Economic Action and Social Structure: The Problem of Embeddedness." *American Journal of Sociology* 91:485-510. [Since Granovetter's influential work, embeddedness has been used to make sense of the social organization of the economy; research has focused on relational embeddedness—that is, the embeddedness of economic action in social networks and relationships—and structural embeddedness—that is, the interdependence of market exchanges and cultural, political, and social background institutions. The idea of relational embeddedness postulates that exchange tends to flow through interpersonal and interorganizational relationships that are based on rules of trust, exclusivity, and loyalty which structure markets and influence exchange outcomes.]

Knight, F. (1921) *Risk, Uncertainty and Profit.* Mass.: Houghton Mifflin. Boston. [Frank Knight in his classic work defines uncertainty as the condition of judgment and of entrepreneurial profit. He states that,

with uncertainty entirely absent, every individual being in possession of perfect knowledge of the situation, there would be no occasion for anything of the nature of responsible management or control of productive activity. Knight's use of uncertainty highlights problems of prediction in economic action. Entrepreneurs who create interpretations of market direction out of this uncertainty are informational entrepreneurs.]

Knorr Cetina, Karin, and Urs Bruegger. (2002). "The Virtual Societies of Financial Markets." *American Journal of Sociology* 107:905-51. [She is part of a group of sociologists working within the traditions of the social study of science who have begun to work on the interplay between technology and the specific forms of economic action. She analyzes the new forms of sociality made possible by electronic technologies that support global interaction. The most remarkable aspect of the work of Knorr Cetina and Bruegger is their use of the textual traces of electronically mediated trading to capture the detailed structures of interaction. Their work, however, is so far unique in this respect; for example, to my knowledge, no-one has used tape-recordings of telephone trading to analyze in detail these crucial verbal negotiations. Of course, getting access to the necessary materials would require the co-operation of the financial institutions whose property they are, but these institutions might well find the conversational analysis of trading of practical relevance.]

Latour, B. (1993) *We have never been modern.* Simon and Schuster (England) and Harvard University Press (United States). [The work of Latour requires us to imagine world cities as embedded in networks that are more or less long, more or less durable, more or less fast, and more or less connected. However, even more than that, and what is perhaps the most interesting idea for empirical world city research now, is that the work of Latour requires world city researchers to consider networks as being constantly made by *both human and nonhuman actors*. In other words, for us to give a great deal of consideration to what Latour calls the "immutable mobiles", texts, technical artefacts, money, human beings, etc., that make-up networks. Immutable mobiles are what can be transported and mobilized without changing their form. In other words, immutable mobiles are durable and this is important because it is only the mobilization of immutable mobiles through delegation that the networks that weave together world cities can be made. Immutable mobiles are methods of long-distance control and consequently are vital to networks.]

MacKenzie, D. (2000). Long-Term Capital Management and the Sociology of Finance. The *London Review of Books*, 13 April. [He describes and advocates a science studies approach to global finance. Science studies is the generic name for a collection of specialisms that examine the contents and contexts of science and technology. These specialisms are diverse: some are historical, some philosophical, some sociological, some anthropological, some draw on literary theory. They have no simple overarching theory or methodology, so it must be emphasized that what he discusses is *a* science studies approach, not *the* science studies approach. The topic of global finance is a new one for science studies, and the work done so far has but scratched the surface of what is possible.]

Sassen, S. (1991). *The Global City*. Princeton University Press. Princeton, NJ. [The sociologist Sassen is famous for her work on the idea of the global city and the idea of a hierarchy of world cities. Building on this agenda Sassen has in recent years become a cartographer of global capitalism drawing lines and producing boundaries as a way of thinking about the interaction of nation-states and the global economy. Moving beyond the idea of the global city as an interface between global and local Sassen has been looking for other "frontier zones", "border zones", "regulatory fractures", or "analytic borderlands" that produce, or are a product of, an overlapping of national and international geographical scales. Sassen has set herself the research agenda of opening up the lines of demarcation that she has represented as separating distinct entities (e.g. the nation-state and the global economy). According to Sassen zones or borderlands can be found where geographical scales overlap and are distinct realms in themselves demanding their own theoretical and empirical specification.]

Biographical Sketch

Carlos H. Betancourth has experience as a strategic designer and planner of large scale urban and regional infrastructure developments. He conducts research focusing on the globalization of regional developments, with particular emphasis on the *global infrastructure* linking the United States and Europe to the emerging markets of Latin America, Asia Pacific and Eastern Europe. Mr. Betancourth works on the development of *intermodal infrastructure concepts* as they relate to strategic city-regions, global cities and the new industrial clusters driving development and economic growth. He has been developing an integrated approach to project development that includes future oriented concepts, global trends,

environmental, social and public-private partnership issues into the traditional economic least-cost approaches. Recently Mr. Betancourth has been working with The Dutch Ministry of Physical Planning, The Environment and Housing developing the planning concept of networked-cities, the role of time in the dynamic of networks and the Fourth Dimensional City as alternative to the notion of The Compact City. He has also conducted research and design on future sustainable urbanization models for the Central Government's urbanization policy for the RandStad. He has recently also been advising the Colombian Government on urban policy particularly as it relates to city-regions. This has included the elaboration of research on the territory and the region as the context for the National Urban Policy; on the new urban processes and emerging urbanization models in Colombia; on the spatial scales of the urban policy; as well as the elaboration of guidelines for a comprehensive national urban policy; one that integrates social, economic, environmental and physical processes; proposal for the implementation of the designated urban policy in the main cities of Colombia. He is working on the dynamic relation between risk and time and how this relation affects the distribution of economic activity in space.