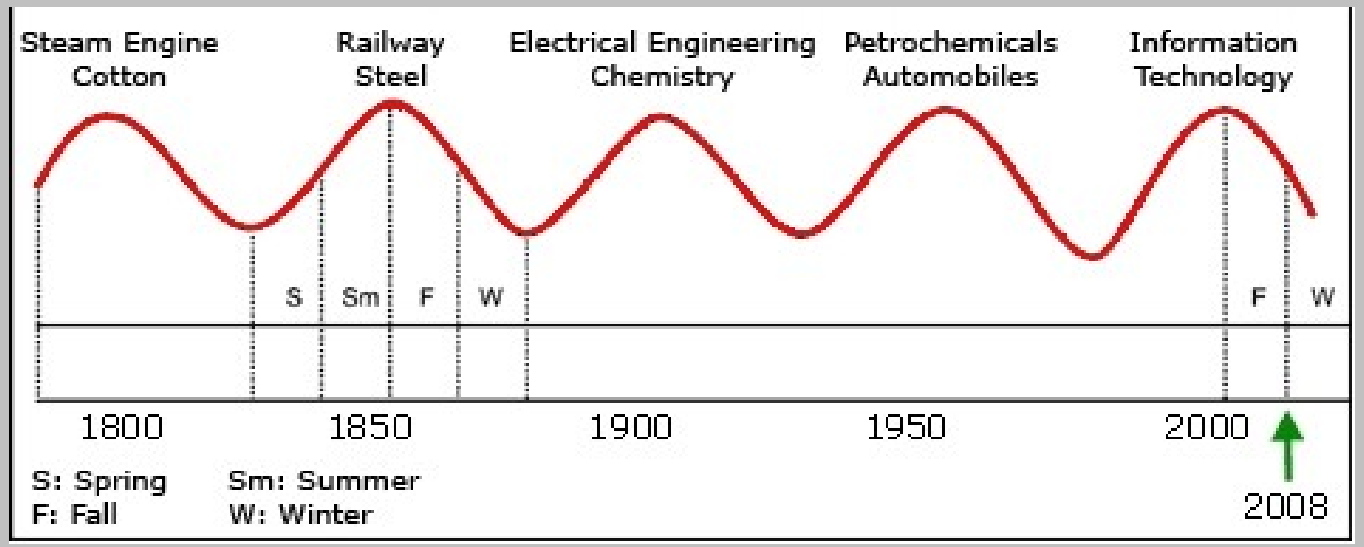
Three Crises

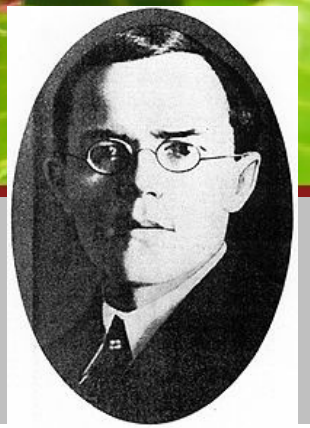
the ‘30s

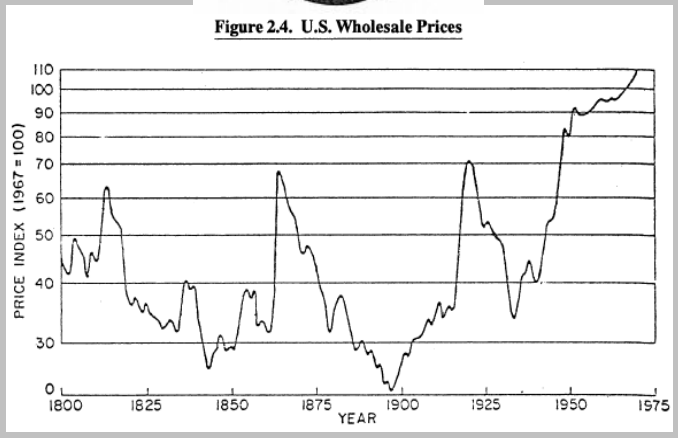
the ‘70s

TODAY

Kondratiev Waves







Using data on prices, interest rates, wages and foreign trade in France, England and the USA, and on total coal and pig-iron production in the world, Kondratiev identified three long waves: rising from 1789 to a peak in 1814, then declining until 1848; rising to a peak in 1873, then declining until 1896; rising to a peak around 1920. He obtained his curves by using a 9-year moving average to smooth out the typical 7- to 11-year "intermediate cycle." As he wrote: "***The long waves really belong to the same complex dynamic process in which the intermediate cycles of the capitalistic economy with their principal phases of upswing and depression run their course. These intermediate cycles, however, secure a certain stamp from the very existence of the long waves. Our investigation demonstrates that during the rise of the long waves years of prosperity are more numerous, whereas years of depression predominate during the downswing.***" He observed that large numbers of technological inventions occurred during the depressions, but were only applied during the next expansion. He also thought that "the most disastrous and extensive wars and revolutions" happen on the upswing "during the period of high tension in the expansion of economic forces." **For Kondratiev, *"the long waves arise out of causes that are inherent in the essence of the capitalistic economy."***

Kondratiev Waves

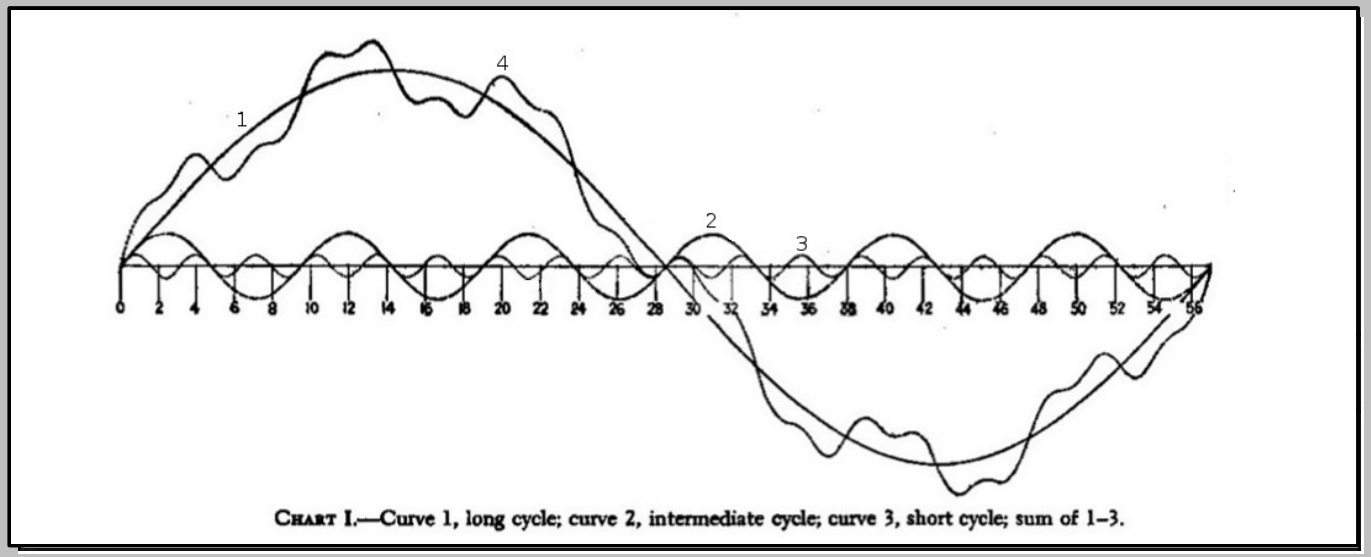
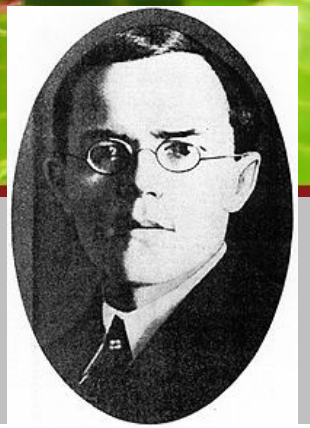
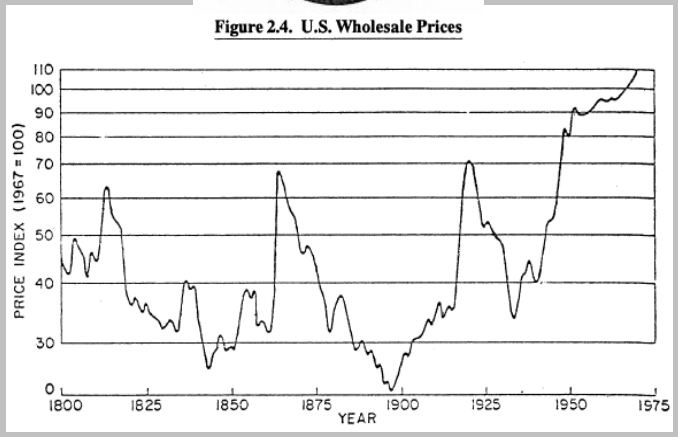


CHART I.—Curve 1, long cycle; curve 2, intermediate cycle; curve 3, short cycle; sum of 1–3.





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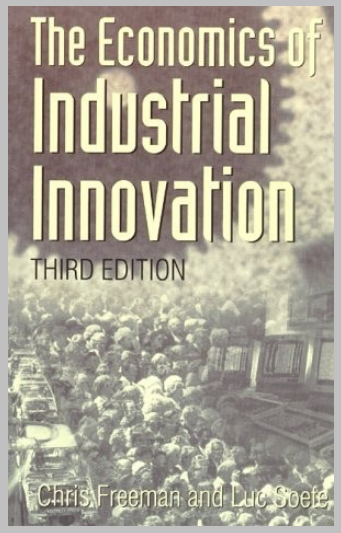
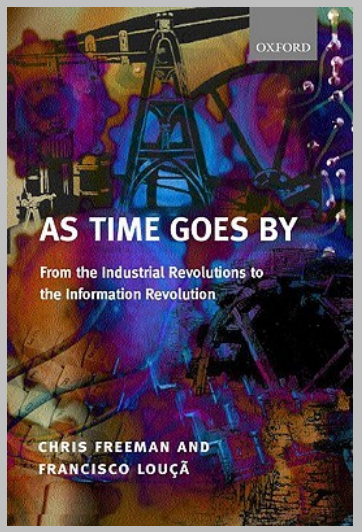
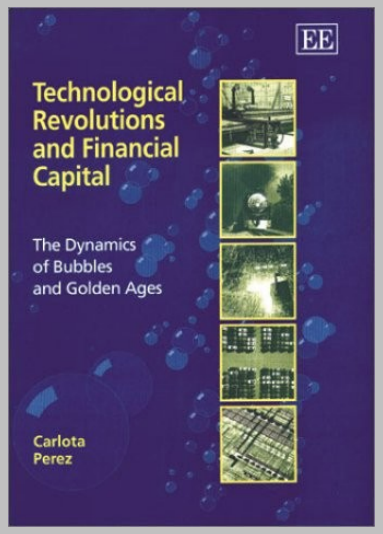
Innovation School







A circle of theorists who gathered from the late ‘60s onward at the Science Policy Research Unit in Britain (SPRU) took this analysis much further. In their view, each of the Kondratiev waves brought together a group of key technologies with a cheap energy source and characteristic modes of transportation and communication, as well as a particular approach to scientific investigation. Distinct ages of industrial development, or “techno-economic paradigms,” could therefore be identified.

Here they are: the age of the textile mill (1780s-1840s), of steam power and railways (1840-90s), of steel and electricity (1890s-1940s), of Fordist mass production (1940s-90s), and finally, of microelectronics and computer networks (1990s-present). Each of these waves begins with major technological and organizational innovations, then grows to a maturity phase and finally ends with a period of stagnation and crisis. Investment in technology is suspended during the crisis, while new inventions accumulate. Then when conditions are right, available capital is sunk into the most promising innovations and a new long wave can be launched.

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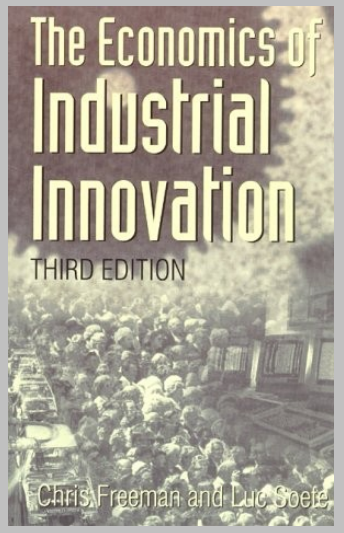
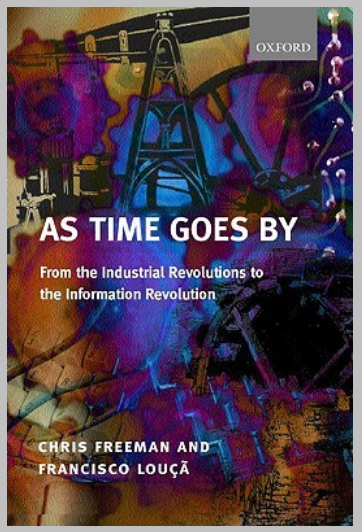




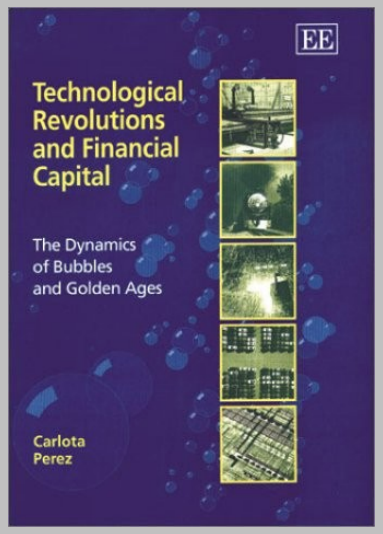
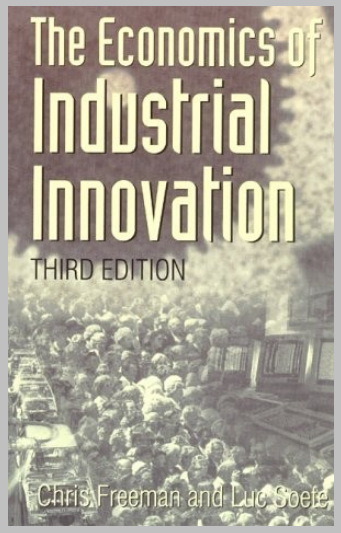
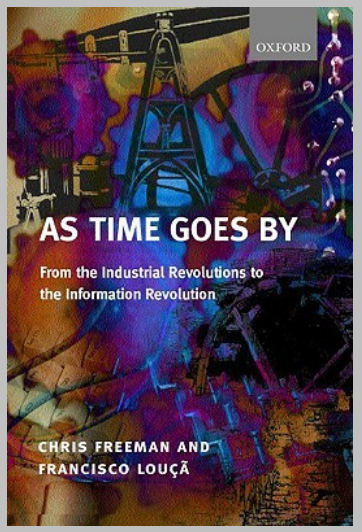


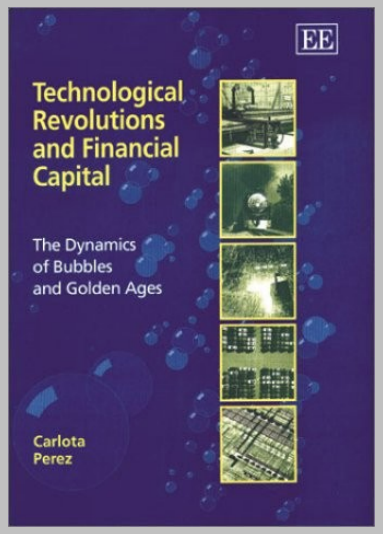
Table 1.3 Successive waves of technical change

Long waves or cycles		*Key features of dominant infrastructure*			
Approx. timing	*Kondratieff waves*	*Science technology education and training*	*Transport communication*	*Energy systems*	*Universal and cheap key factors*
First 1780s–1840s	Industrial revolution: factory production for textiles	Apprenticeship, learning by doing, dissenting academies, scientific societies	Canals, carriage roads	Water power	Cotton
Second 1840s–1890s	Age of steam power and railways	Professional mechanical and civil engineers, institutes of technology, mass primary education	Railways (iron), telegraph	Steam power	Coal, iron
Third 1890s–1940s	Age of electricity and steel	Industrial RD labs, chemicals and electrical, national laboratories, Standards laboratories	Railways (steel), telephone	Electricity	Steel
Fourth 1940s–1990s	Age of mass production ('Fordism') of automobiles and synthetic materials	Large-scale industrial and government RD, mass higher education	Motor highways, radio and TV, airlines	Oil	Oil, plastics
Fifth 1990s–?	Age of microelectronics and computer networks	Data networks, RD global networks, lifetime education and training	Information highways, digital networks	Gas/oil	Microelectronics

Innovation School







"We propose that the capitalist system be seen as a single very complex structure, the sub-systems of which have different rates of change. For the sake of simplicity we can assume two main subsystems: on the one hand a techno-economic, and on the other a social and institutional, the first having a much faster rate of response... A structural crisis (ie the depression in a long wave), as distinct from an economic recession, would be the visible syndrome of a breakdown in the complementarity between the dynamics of the economic subsystem and the related dynamics of the socio-institutional framework."

Carlota Perez

But who has really done this kind of research?

Karl Marx, *Capital*, chap. 15

"Technology reveals the active relation of man to nature, the direct process of the production of his life, and thereby it also lays bare the process of the production of the social relations of his life, and of the mental conceptions that flow from those relations."

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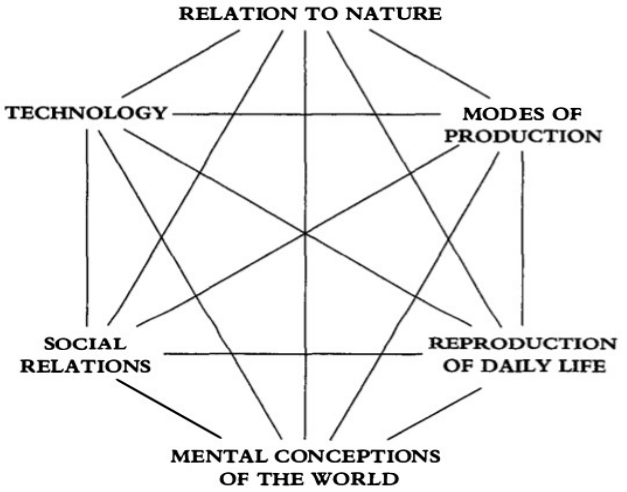

David Harvey, *The Enigma of Capital*

Karl Marx, *Capital*, chap. 15

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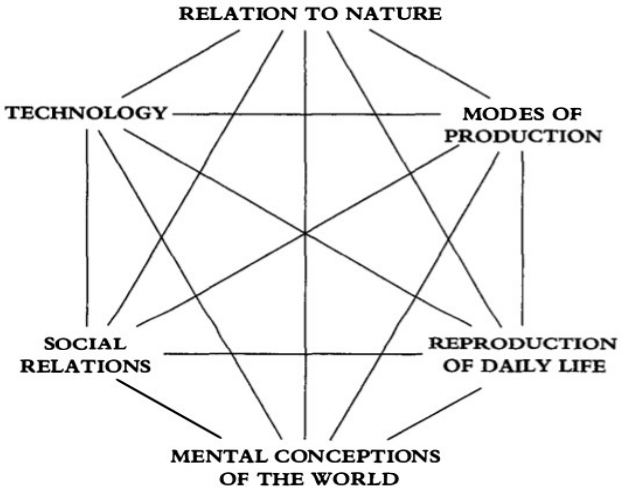
Six spheres of human activity

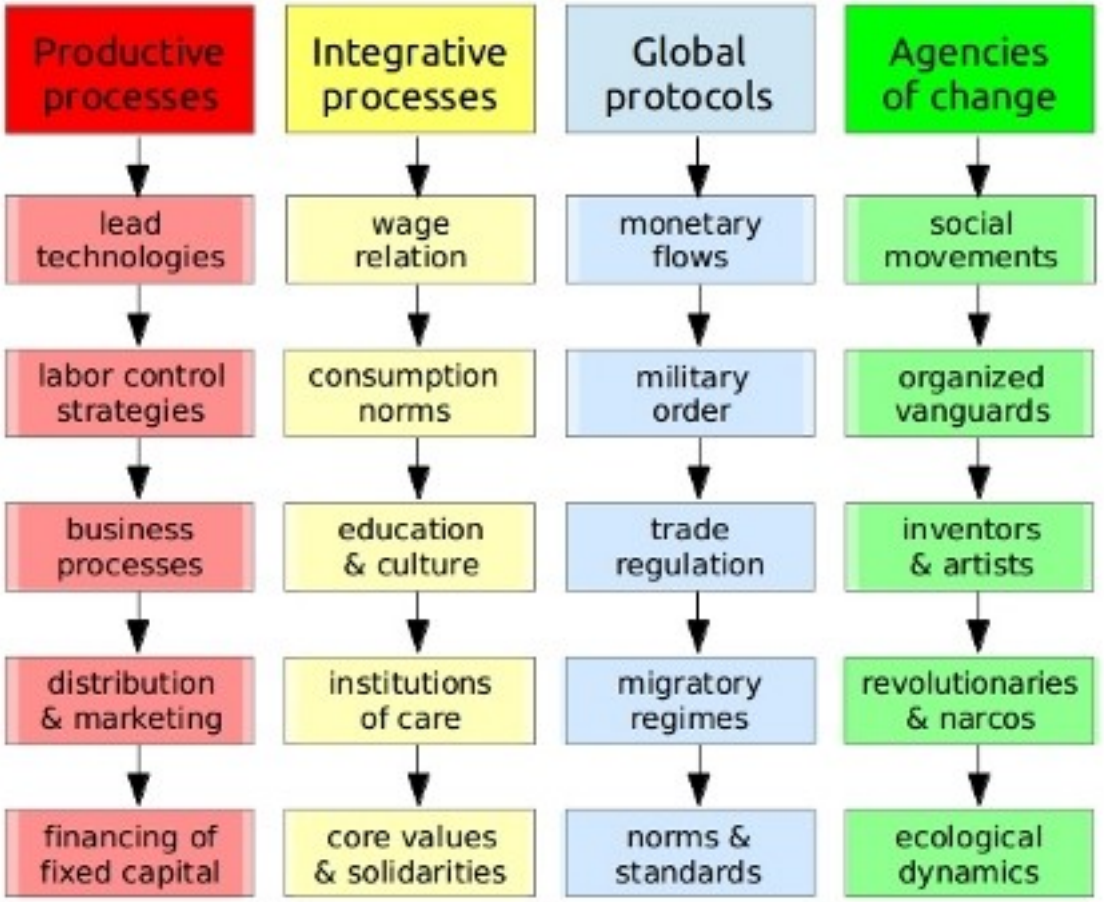
"In this long chapter on machinery, the different spheres co-evolve in ways that accommodate and consolidate the permanently revolutionary character of capitalism. Mental conceptions of production as an art were displaced by scientific understandings and the conscious design of new technologies. Class, gender and family relations shifted as workers were increasingly reduced to the status of flexible appendages to the machine rather than as individuals endowed with the unique skills of the artisan. At the same time, capitalists mobilized new technologies and organizational forms as weapons in class struggle against labor (eventually using the machine to discipline the laboring body). The entry of a large number of women into the labor force, then as now, had all sorts of social ramifications. Public education became necessary as flexibility and adaptability of labor to different tasks became a crucial requirement. This brought forth other institutional changes, notably the educational clauses in the Factory Act of 1848... New organizational forms (the corporate factory) promoted new technologies under new institutional arrangements that had ramifications for social relations and the relation to nature. At no point does it seem as if any one of the spheres dominated the others."

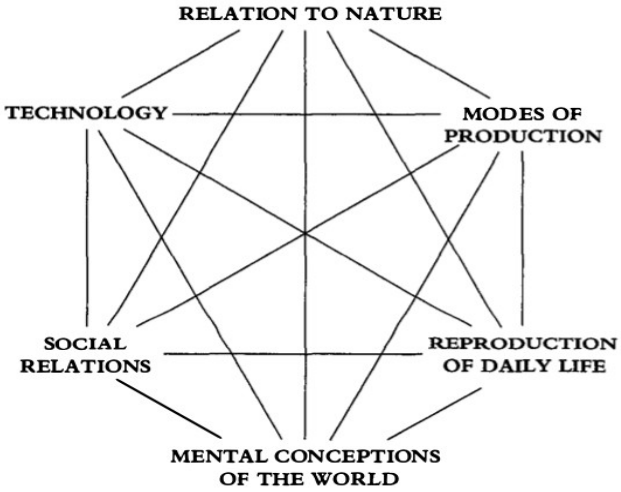


David Harvey, *The Enigma of Capital*

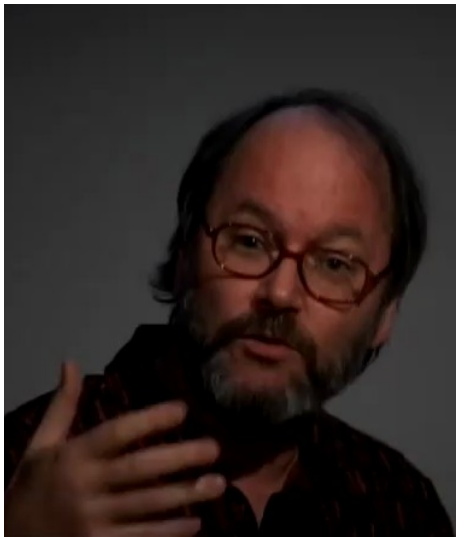
Armin Medosch

"We propose to develop a cooperative, open-content research format that will facilitate a detailed theoretical debate on the historical relations between technological and political transformations, culminating in studies of the present crisis of "informationalism" or the "network society." Building on existing concepts of the technological paradigm, we seek to enlarge the current horizons of research by establishing a chronological framework to track developments in the arts and the communications media as well as changing patterns of consumption, circulation, self-organization and political mobilization."

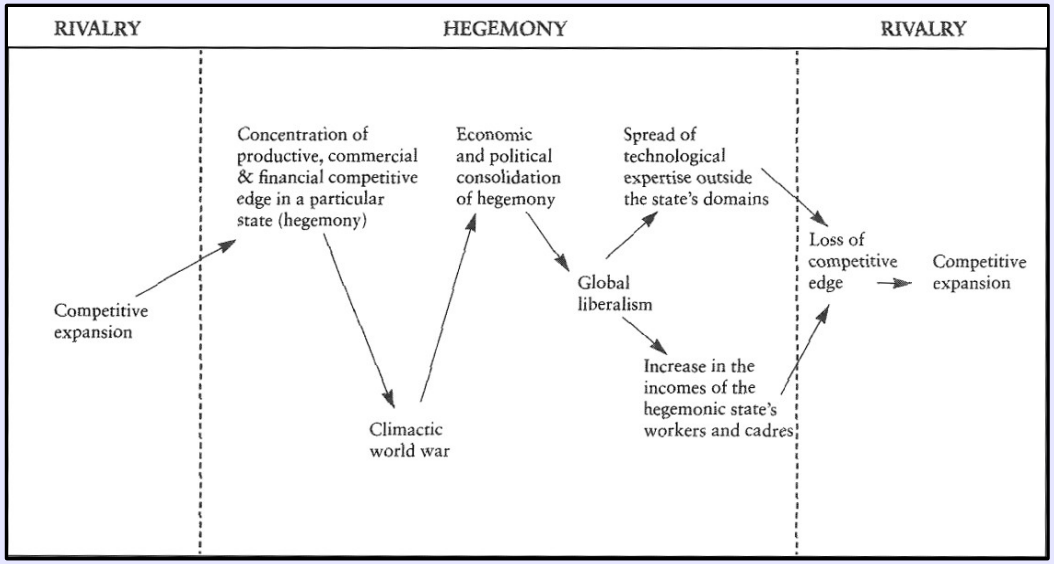


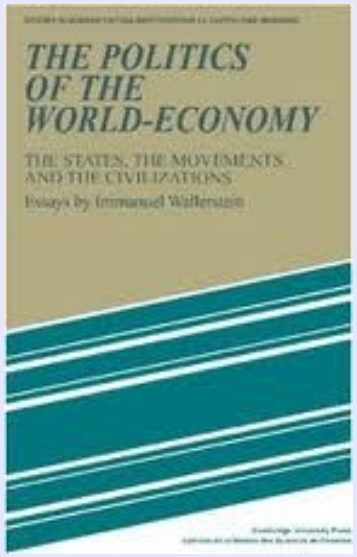


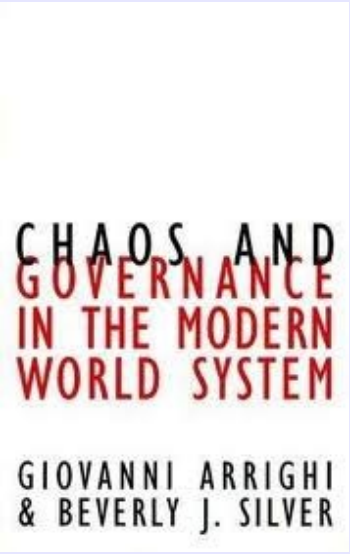
Brian Holmes



Hegemonic transition Wallerstein / Arrighi



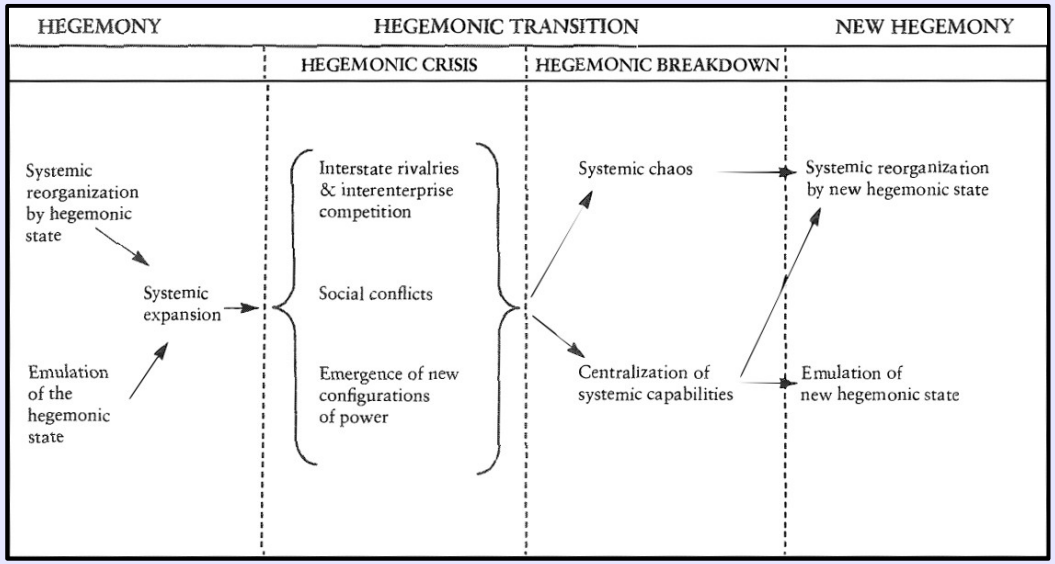


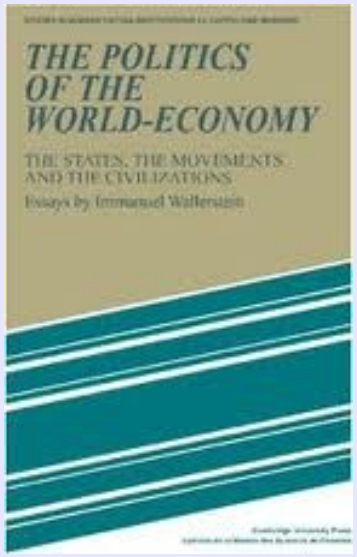


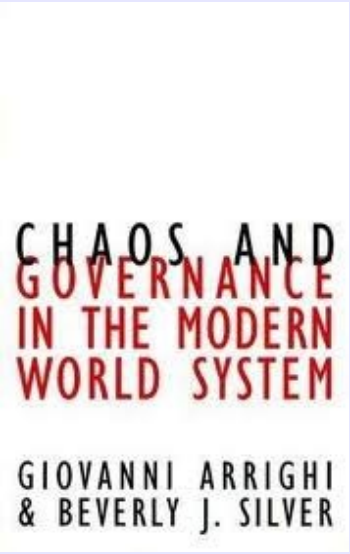
"Hegemony [*according to Wallerstein*] is the outcome of long periods of "competitive expansion"... The rising hegemon acquires its decisive edge first in production, then in commerce, and then in finance. But hegemony is firmly secured only through victory in a thirty-year-long climactic "world war" -- the Thirty Years' War from 1618 to 1648, the Napoleonic Wars from 1792 to 1815, and the long Eurasian wars from 1914 to 1945. "The winner's economic edge is expanded by the very process of the war itself, and the postwar interstate settlement is designed to encrust that greater edge and protect it against erosion" (Wallerstein, *Politics of the World-Economy*). This postwar settlement consists of one form or another of "global liberalism" aimed at enforcing "the principle of the free flow of the factors of production (goods, capital and labor) throughout the world- economy."

G. Arrighi, B. Silver and others, *Chaos & Governance in the Modern World-System*

Hegemonic transition Wallerstein / Arrighi







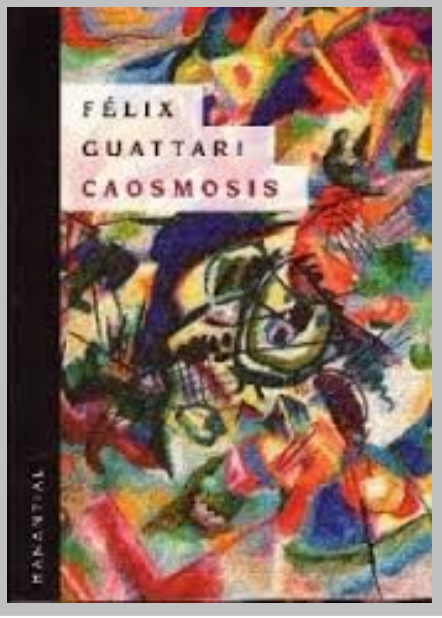
"In our model [*Arrighi, Silver et. al.*], systemic expansions are embedded in a particular hegemonic structure they tend to undermine. They are the outcome of the interplay of two different kinds of leadership. Systemic reorganization promotes expansion by endowing the system with a wider or deeper division of labor. Emulation provides the separate states with the motivational drive needed to mobilize energies and resources in the expansion. There is always a tension between these two tendencies because a wider and deeper division of labor involves cooperation among the system's units, while emulation fosters their mutual competition. Hegemonic crises are characterized by three distinct, but closely related processes: the intensification of interstate and interenterprise competition; the escalation of social conflicts; and the interstitial emergence of new configurations of power."

G. Arrighi, B. Silver and others, *Chaos & Governance in the Modern World-System*

If we could become its inner eye, if we could transport ourselves into its inner soul. if we could hear the relentless beat of accumulation, we could experience as well as know the madness of this obsessiveness – this world where capital and money are a religious and aesthetic experience, and where power is a moral category. When we examine ourselves, we find capital within our own souls. We too rush through the present; we race for some victory – or toward some unknown destination; we are governed by unlimited desire; we stumble and fall from identity into the abyss. We create our own personal crisis, as capital creates its own crisis.

James O'Connor, The Meaning of Crisis

Powers



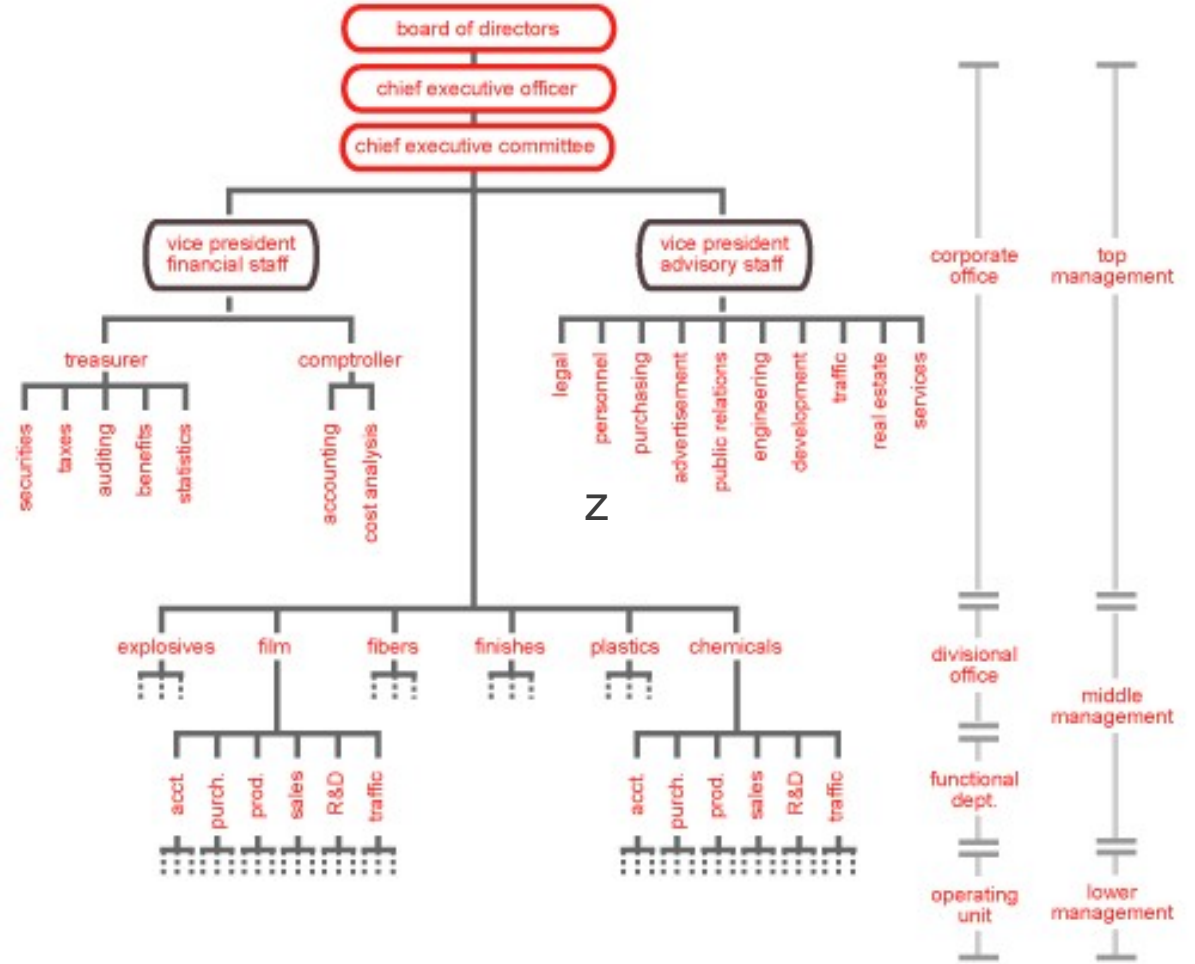
of chaos...

What processes are set in motion in the awareness of an inhabitual shock? How do modifications to a mode of thinking, to an aptitude for the apprehension of a changing external world, take effect? How do representations of the external world change as it changes? ...

We are entering an epoch where, the antagonisms of the cold war having receded, there appear even more distinctly the major threats that our productivist societies have imposed upon the human species, whose survival on this planet is threatened not only by environmental deterioration, but also by the degeneration of social solidarities and modes of psychic life that will literally have to be reinvented. The remaking of politics must pass through aesthetic dimensions that are implicated in the three ecologies of the environment, the socius, and the psyche. A response to the poisoning of the atmosphere, and global warming due to the greenhouse effect, is inconceivable without a mutation of mentalities, without the advancement of a new art of living.

Félix Guattari, Chaosmosis

1920s: Vertically integrated multidivisional corporation



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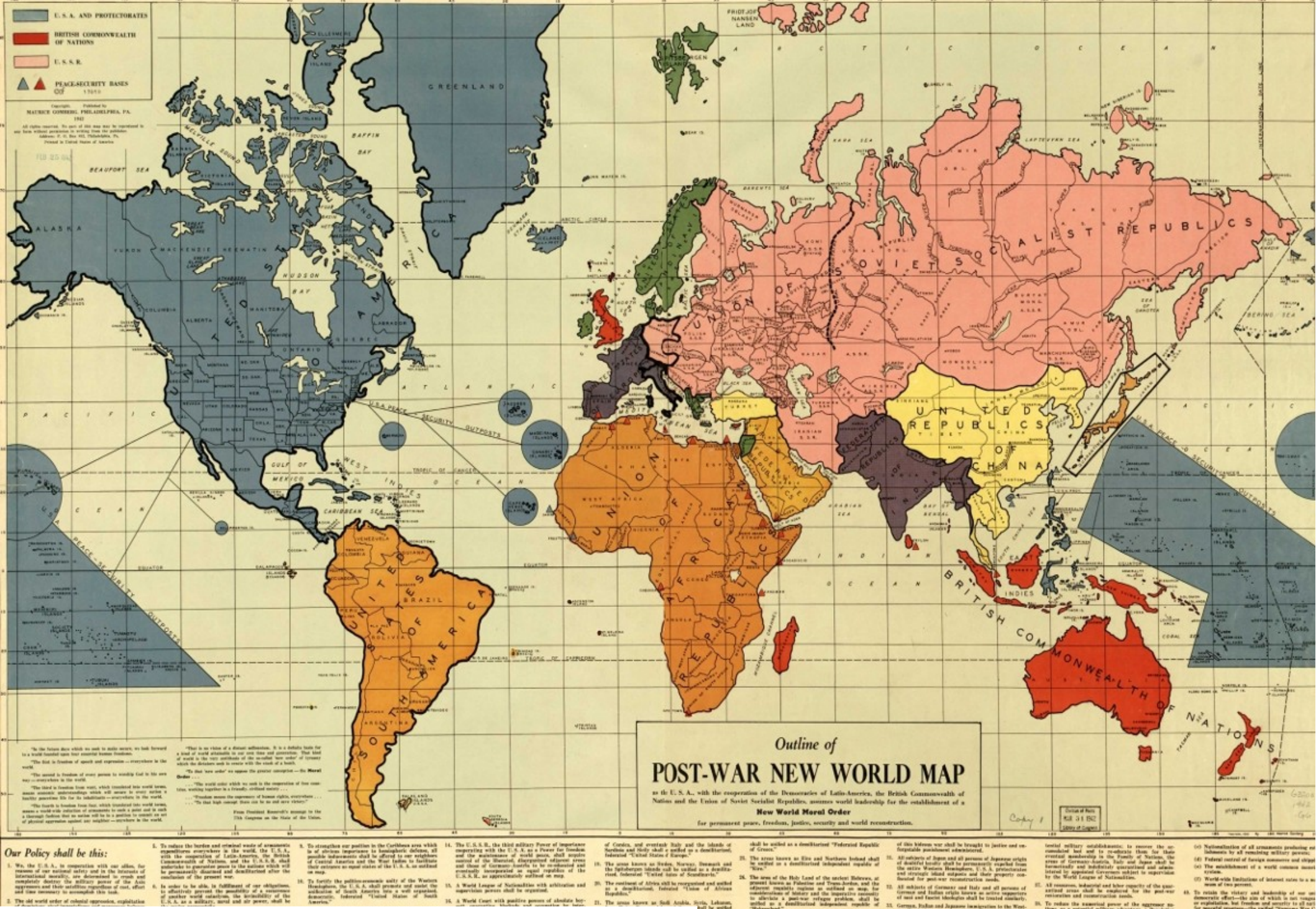
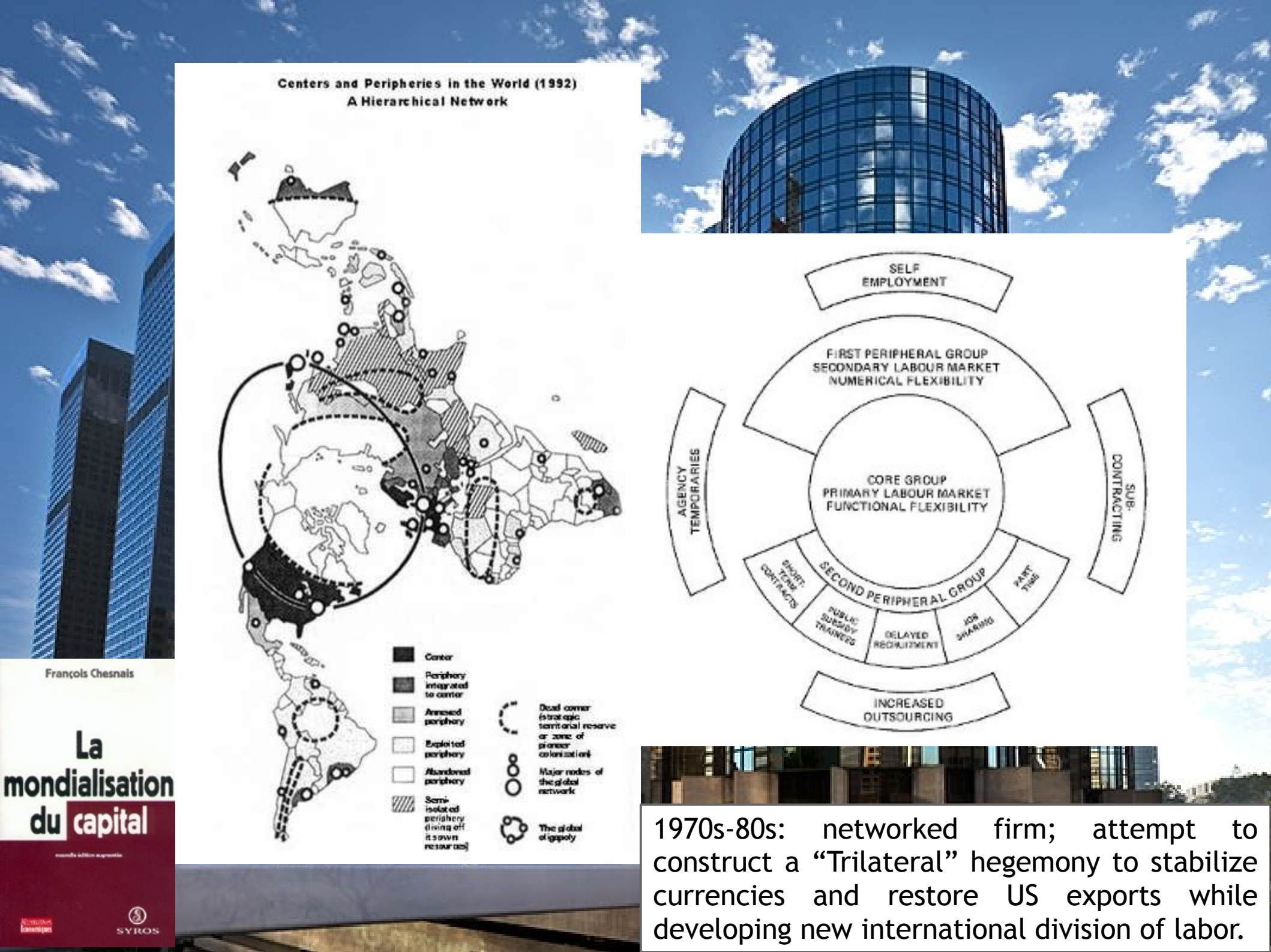
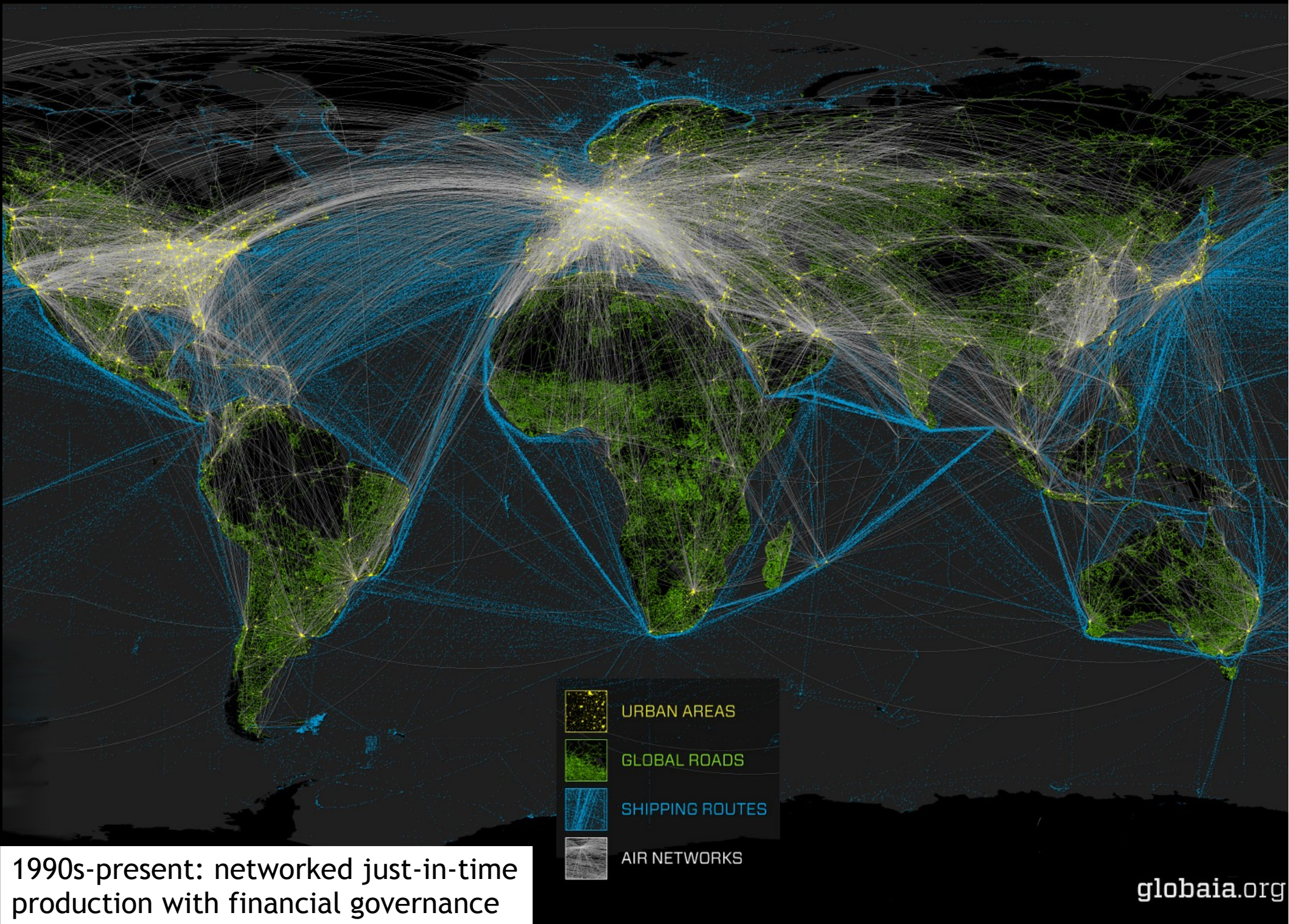


1950s-60s: global currency exchange and standard legal environments for multinational corporations

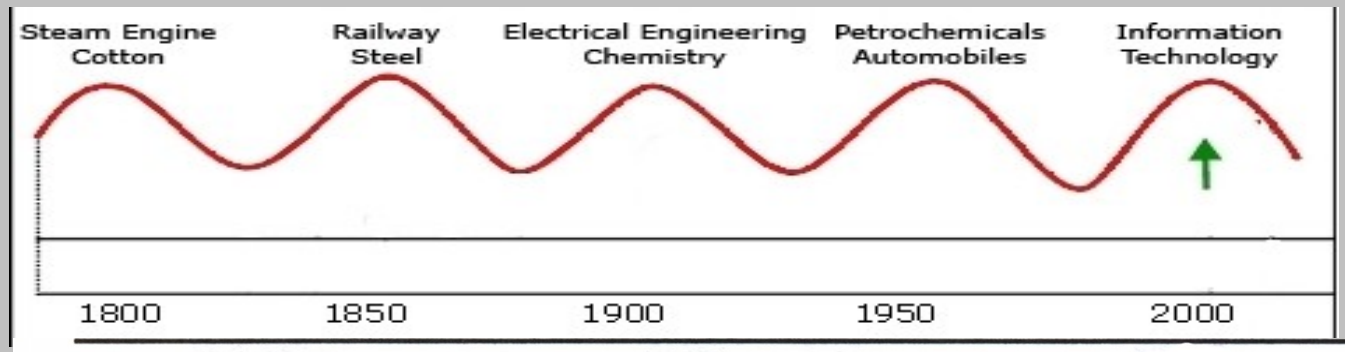


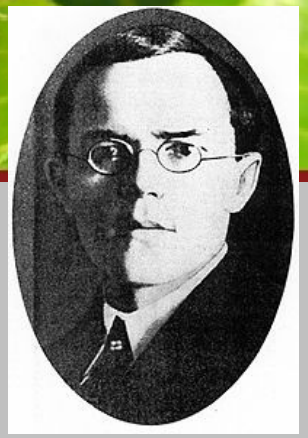
1970s-80s: networked firm; attempt to construct a “Trilateral” hegemony to stabilize currencies and restore US exports while developing new international division of labor.



1990s-present: networked just-in-time production with financial governance

Neoliberal Informationalism





Fifth Kondratiev

1 Number	2 Approx. periodization Upswing Downswing	3 Description	4 Main 'carrier branches' and induced growth sectors Infrastructure	5 Key factor industries offering abundant supply at descending price	6 Other sectors growing rapidly from small base	7 Limitations of previous techno-economic paradigm and ways in which new paradigm offers some solutions	8 Organization of firms and forms of co-operation and competition
Fifth*	1980s and 1990s to ?	Information and communication Kondratieff	Computers Electronic capital goods Software Telecommunications equipment Optical fibres Robotics FMS Ceramics Data banks Information services Digital telecommunications network Satellites	'Chips' (microelectronics)	'Third generation' biotechnology products and processes Space activities Fine chemicals SDI	Diseconomies of scale and inflexibility of dedicated assembly-line and process plant partly overcome by flexible manufacturing systems, 'networking' and 'economies of scope'. Limitations of energy intensity and materials intensity partly overcome by electronic control systems and components. Limitations of hierarchical departmentalization overcome by 'systemation', 'networking' and integration of design, production and marketing.	'Networks' of large and small firms based increasingly on computer networks and close co-operation in technology, quality control, training, investment planning and production planning ('just-in-time') etc. *Keiretsu* and similar structures offering internal capital markets.

the mysterious bi-continent

“Chimerica”

the mysterious bi-continent

“Chimerica”

From: “Do Containers Dream of Electric People?”

Intermodal transport, or containerization, is based on three pillars: rigorous standardization of the box; continuous traceability; sealed shipment from departure to destination. It all began on April 26, 1956, when Malcom McLean loaded 58 aluminum truck bodies onto a tanker named the Ideal-X for shipment from Newark to Houston. The water-to-wheels concept offered increases in speed and security as well as big savings on labor. These advantages were recognized by the US government and the military, spurring a national standardization process that would be ratified by the International Standards Organization in 1970. Deregulation of the US transport industry was completed by the early 1980s; the rationalization of the docks broke the power of the longshoremen’s unions, historically the strongest and most internationalist sector of the labor movement. These developments smoothed the way for an integrated intermodal system that spread rapidly across the world, slashing freight costs and making logistics the key operational discipline of a globalizing economy. Given the military origins of logistics, it’s significant that the first big government contracts with McLean’s Sea-Land corporation were for war matériel to Vietnam. And it’s equally significant that Sea-Land’s wartime business became immensely profitable when McLean realized that the returning containers could be filled with the rising tide of manufactured goods from Japan.

the mysterious bi-continent

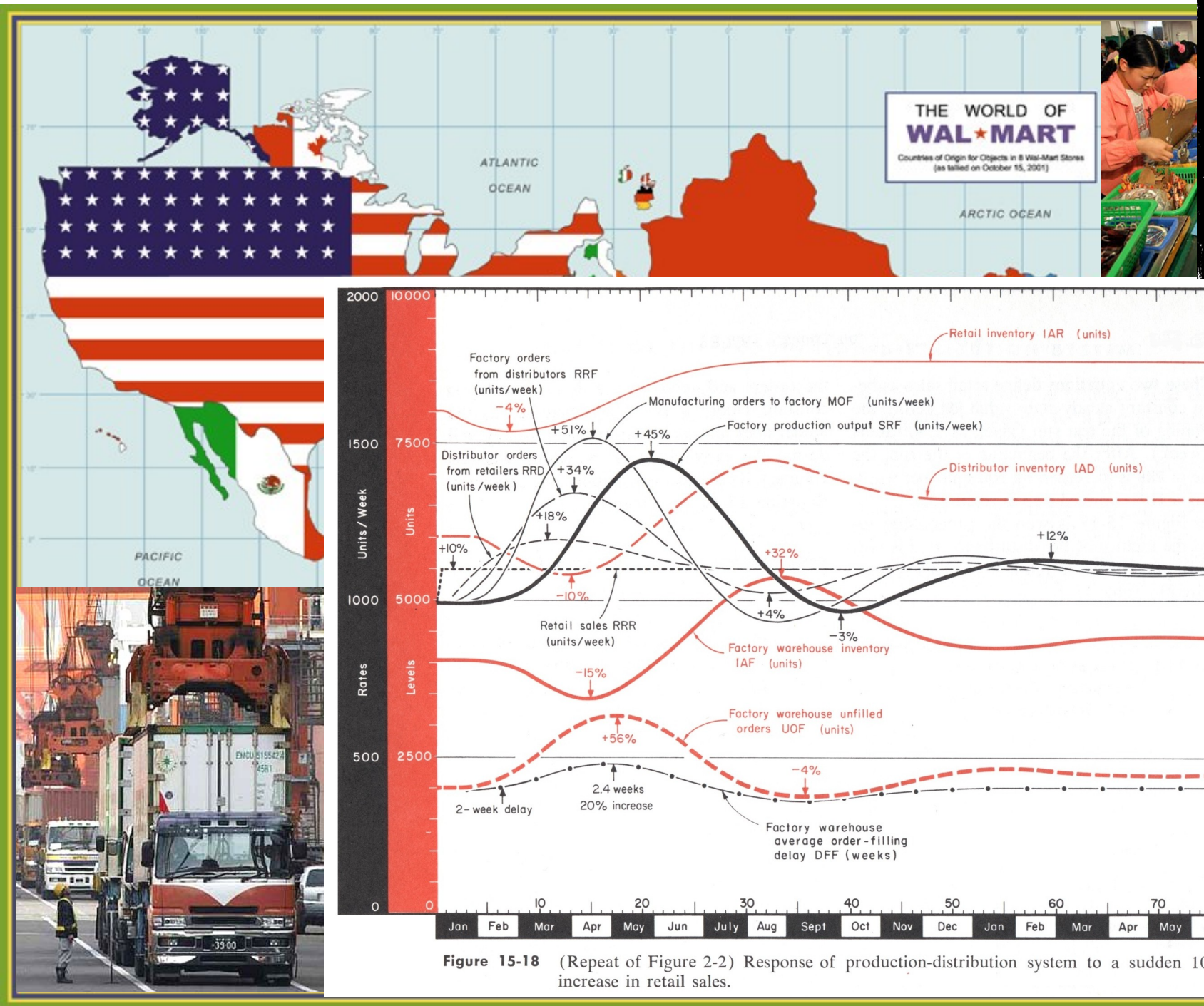
“Chimerica”

From: “Do Containers Dream of Electric People?”

The late 1960s saw the take-off of the Japanese economy, first in light consumer goods and then, after the oil shock of 1973, in fuel-efficient automobiles. Already the Toyota Motor Corporation had developed its system of continuous information flow between manufacturer and supplier, allowing for the delivery of custom-built parts in exact proportion to current needs without costly warehousing. The advent of containerization meant that “just-in-time” production could be extended to an entire East Asian maritime network including the “Four Tigers” of Hong Kong, Singapore, Taiwan and South Korea – a network that would ultimately recenter on coastal China. In the wake of Toyota’s success, just-in-time or “lean” production imposed itself on global auto-makers. It received wider attention through a best-selling industry study entitled *The Machine that Changed the World* (where “machine” refers not to a single device but to an integrated process). However, its adoption by Western corporations after 1989 turned it into something very different from the trust-based relations between manufacturer and supplier extolled by the venerable Mr. Toyoda. What emerged from the open markets of neoliberalism was a vast delivery system commanded by retailers engaged in a vicious search for the best possible price. And that turned out to be the “China price”: the lowest number on the planet for any category of basic manufactured goods.

the mysterious bi-continent

"Chimerica"



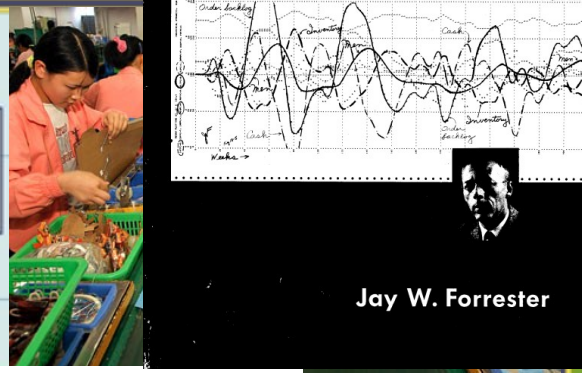
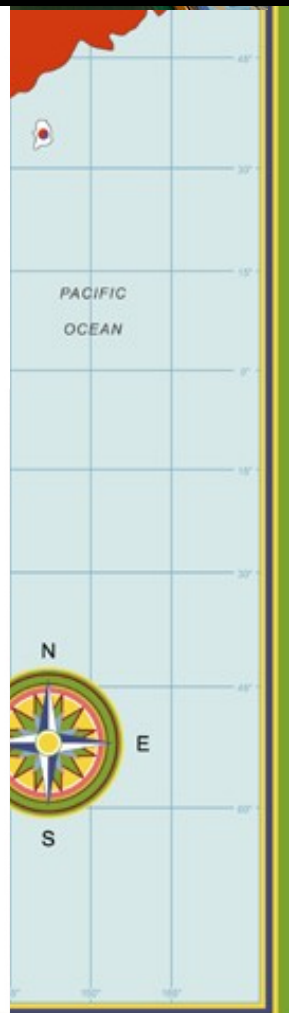


Figure 15-18 (Repeat of Figure 2-2) Response of production-distribution system to a sudden 10% increase in retail sales.



the mysterious bi-continent

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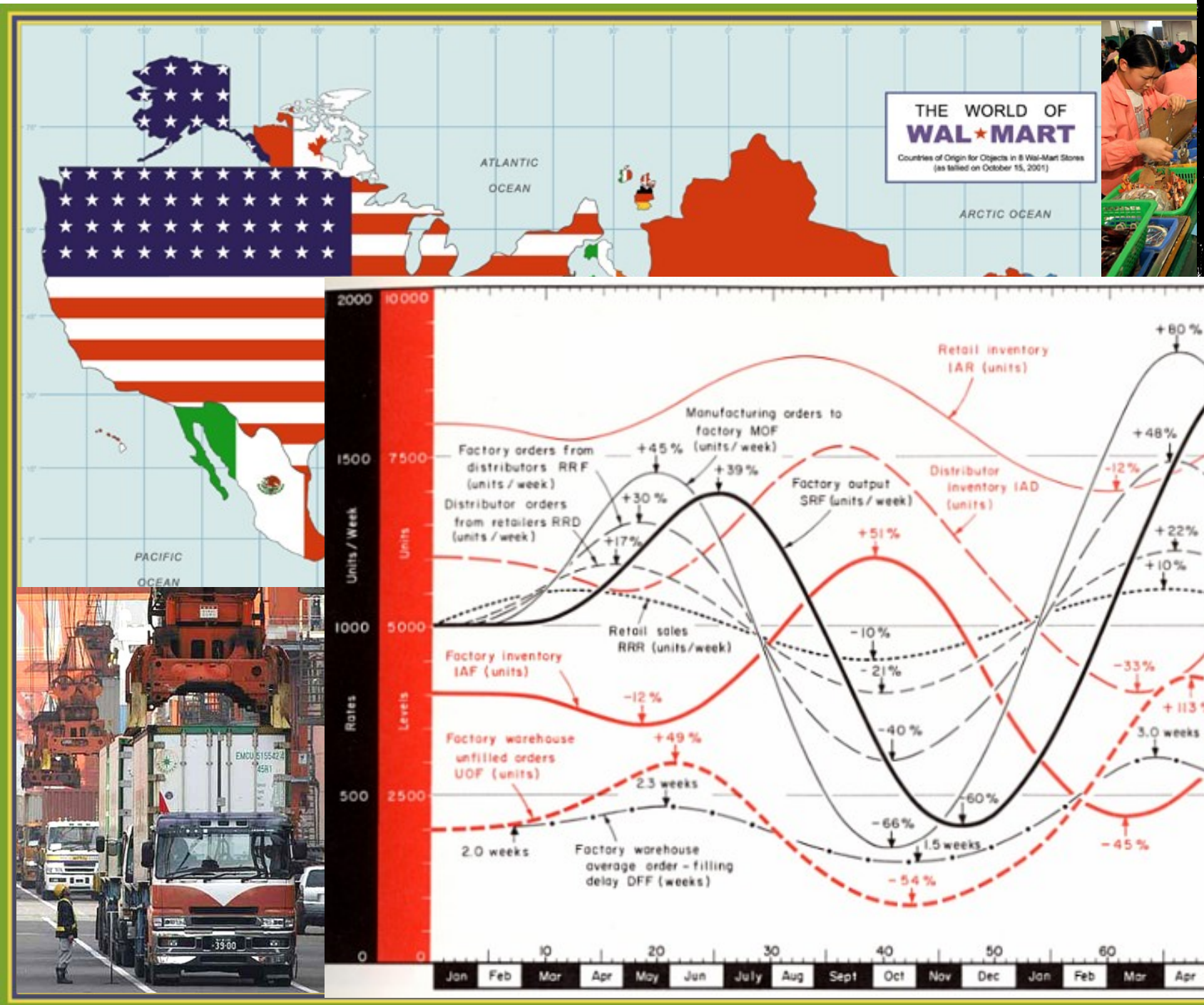
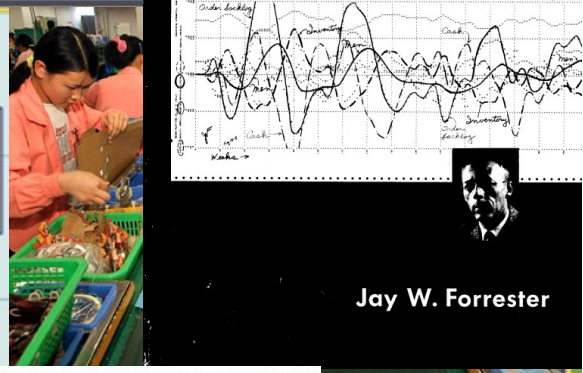
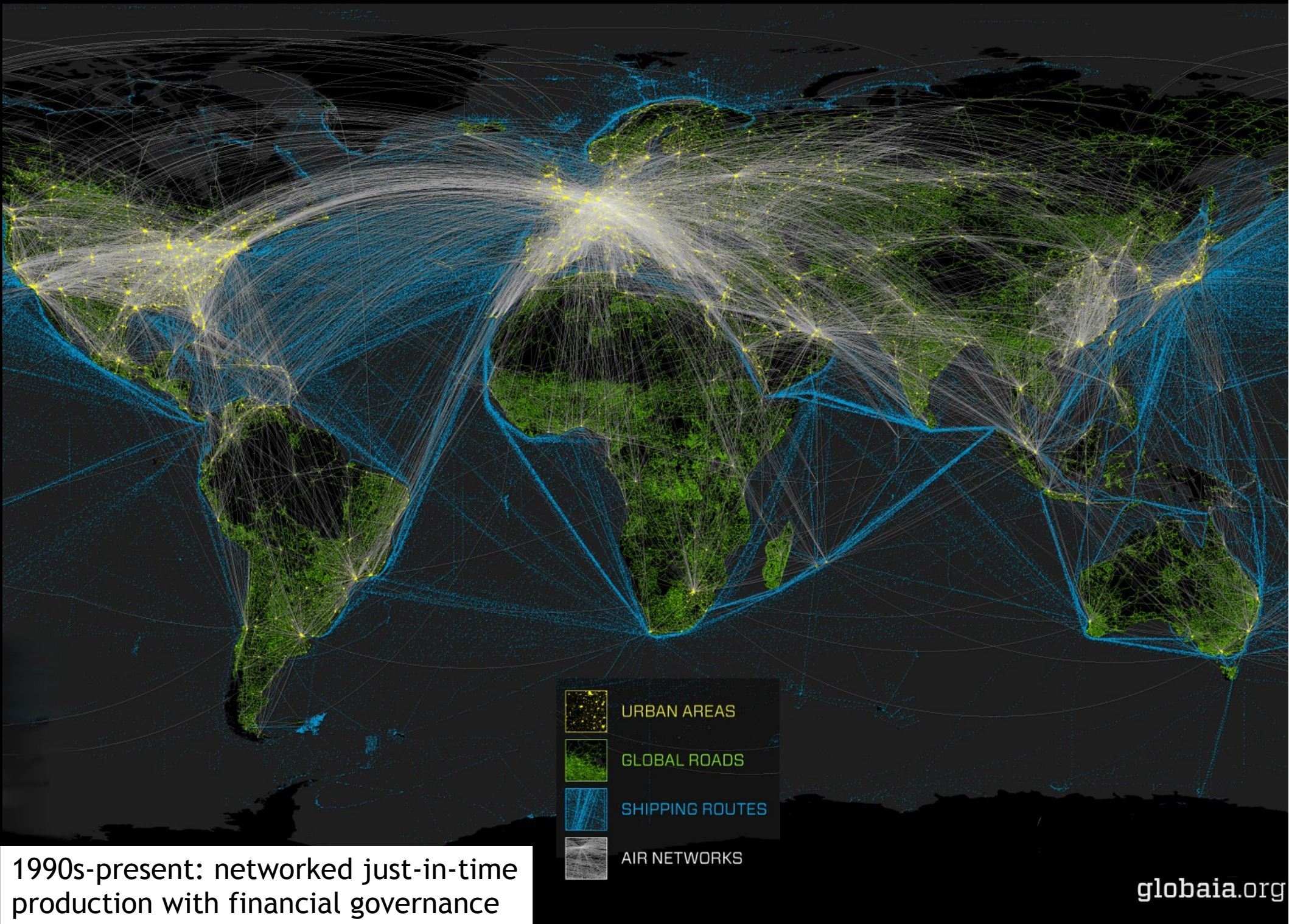
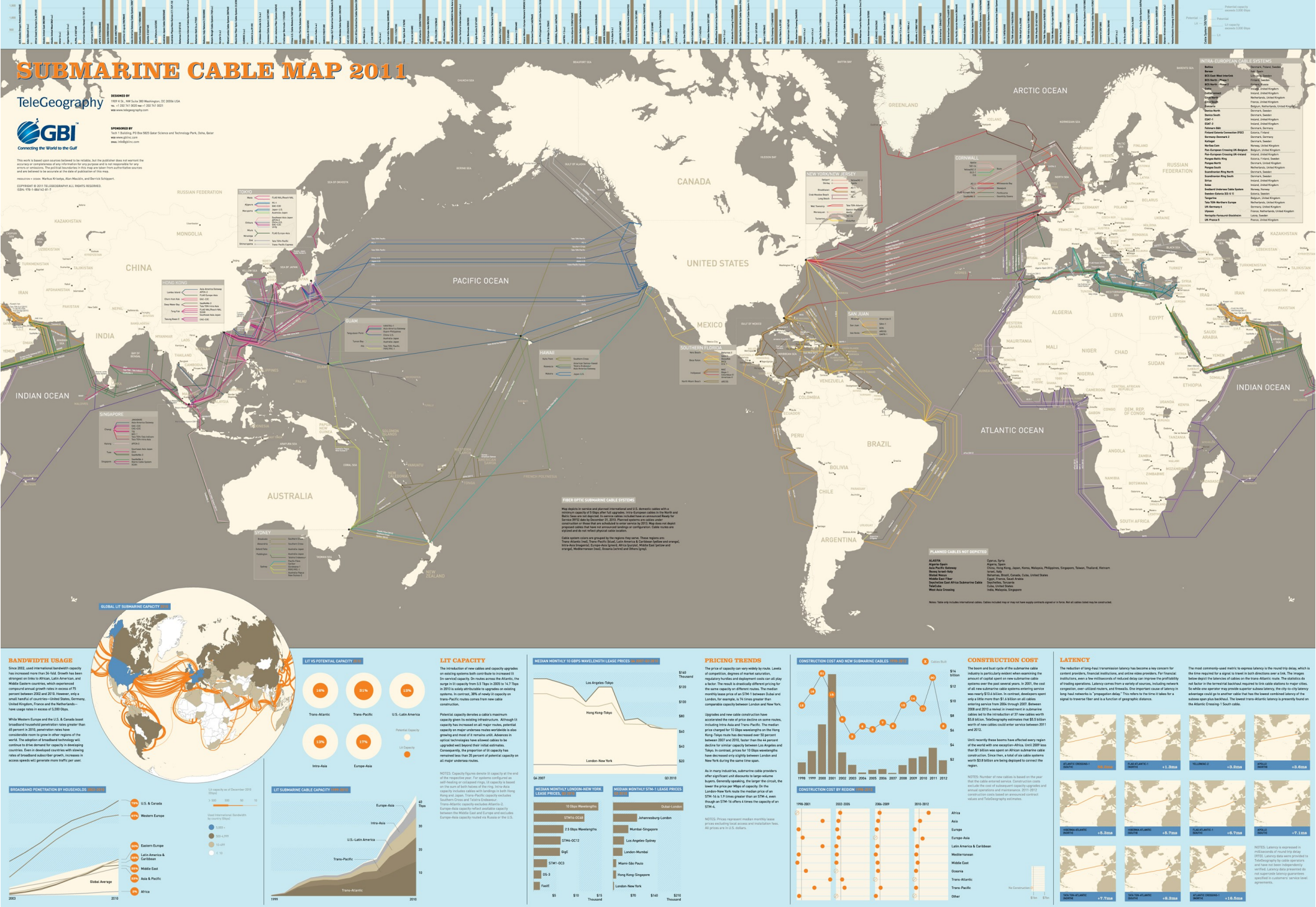


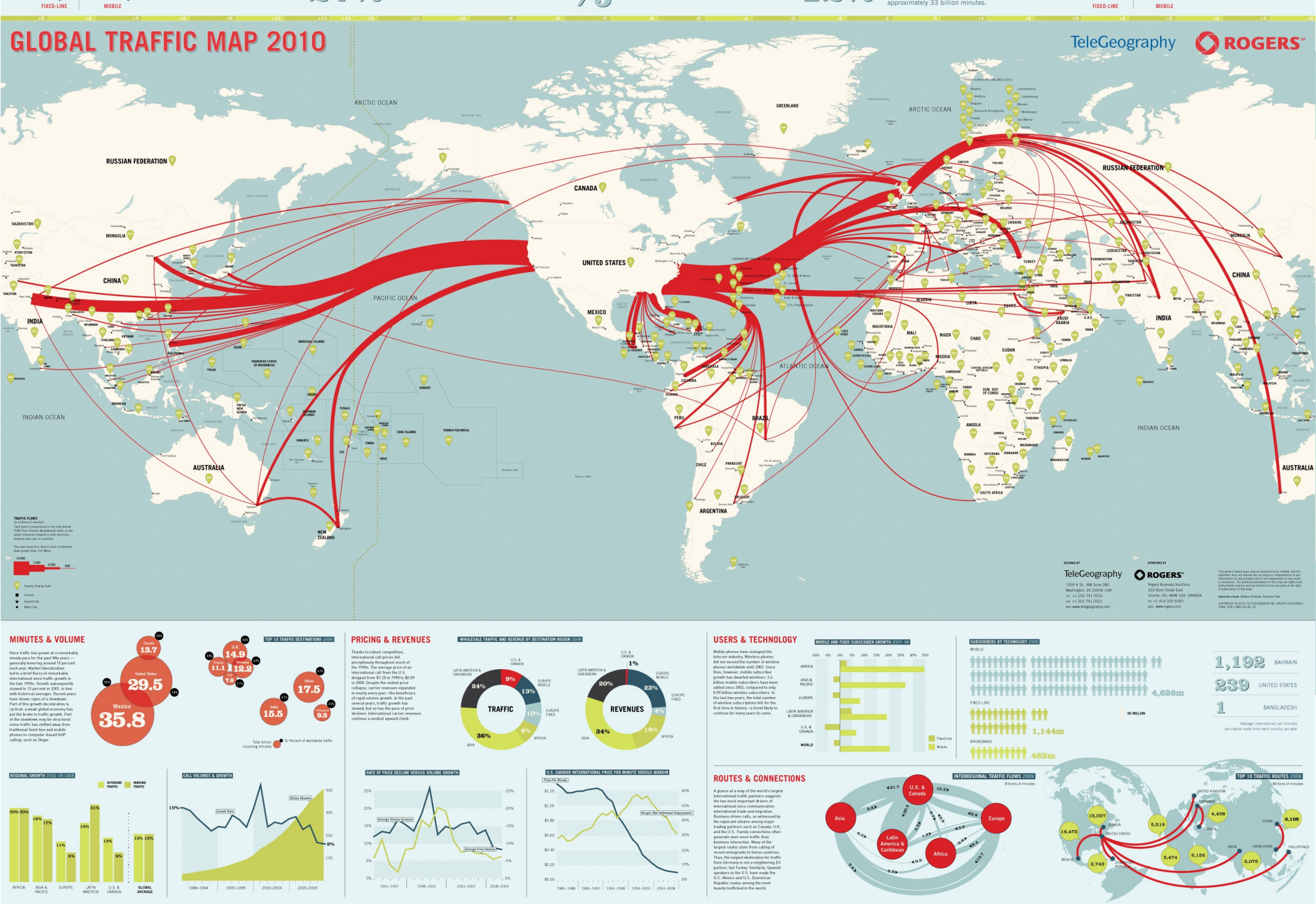




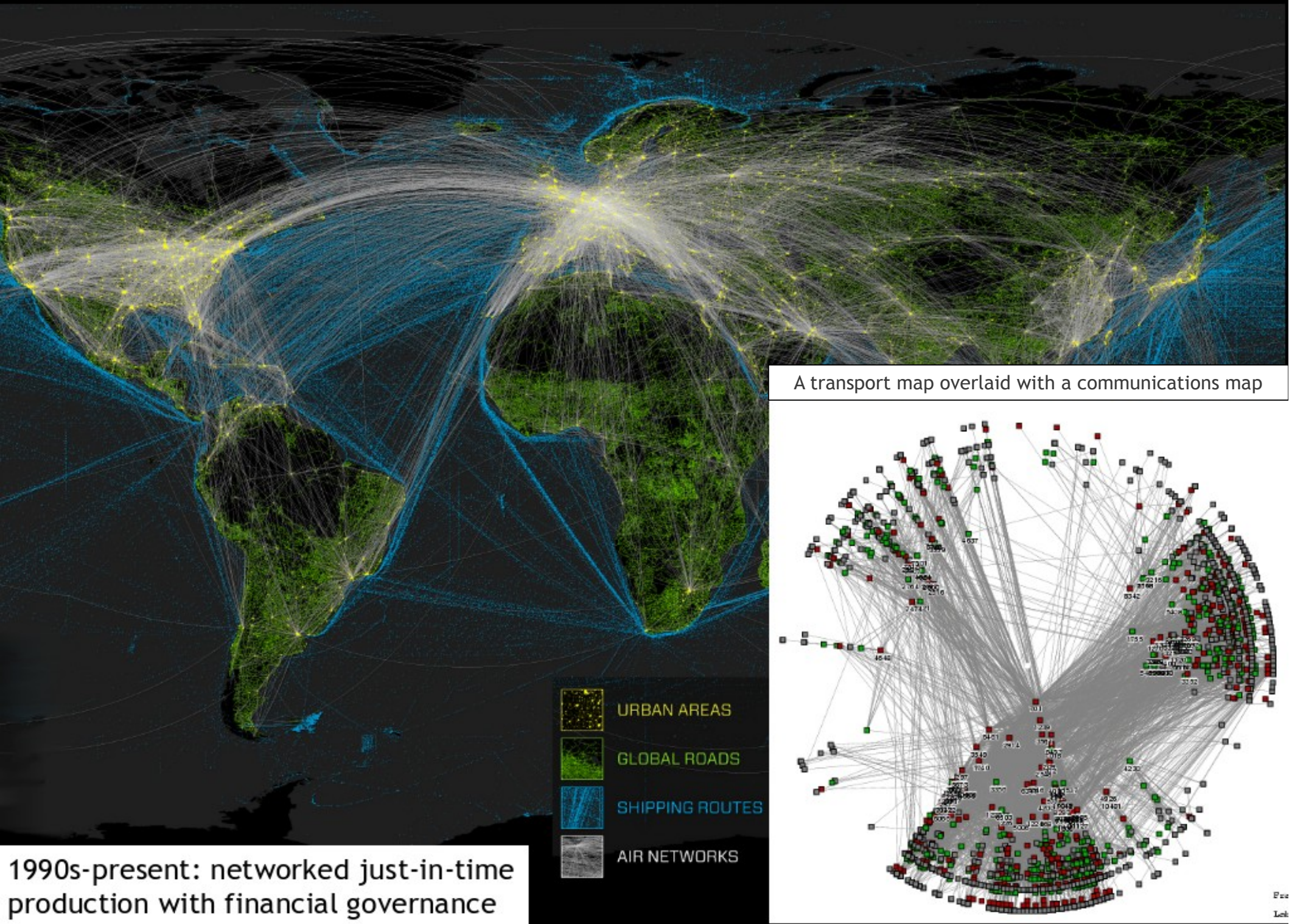
1990s-present: networked just-in-time production with financial governance



1990s-present: networked just-in-time production with financial governance

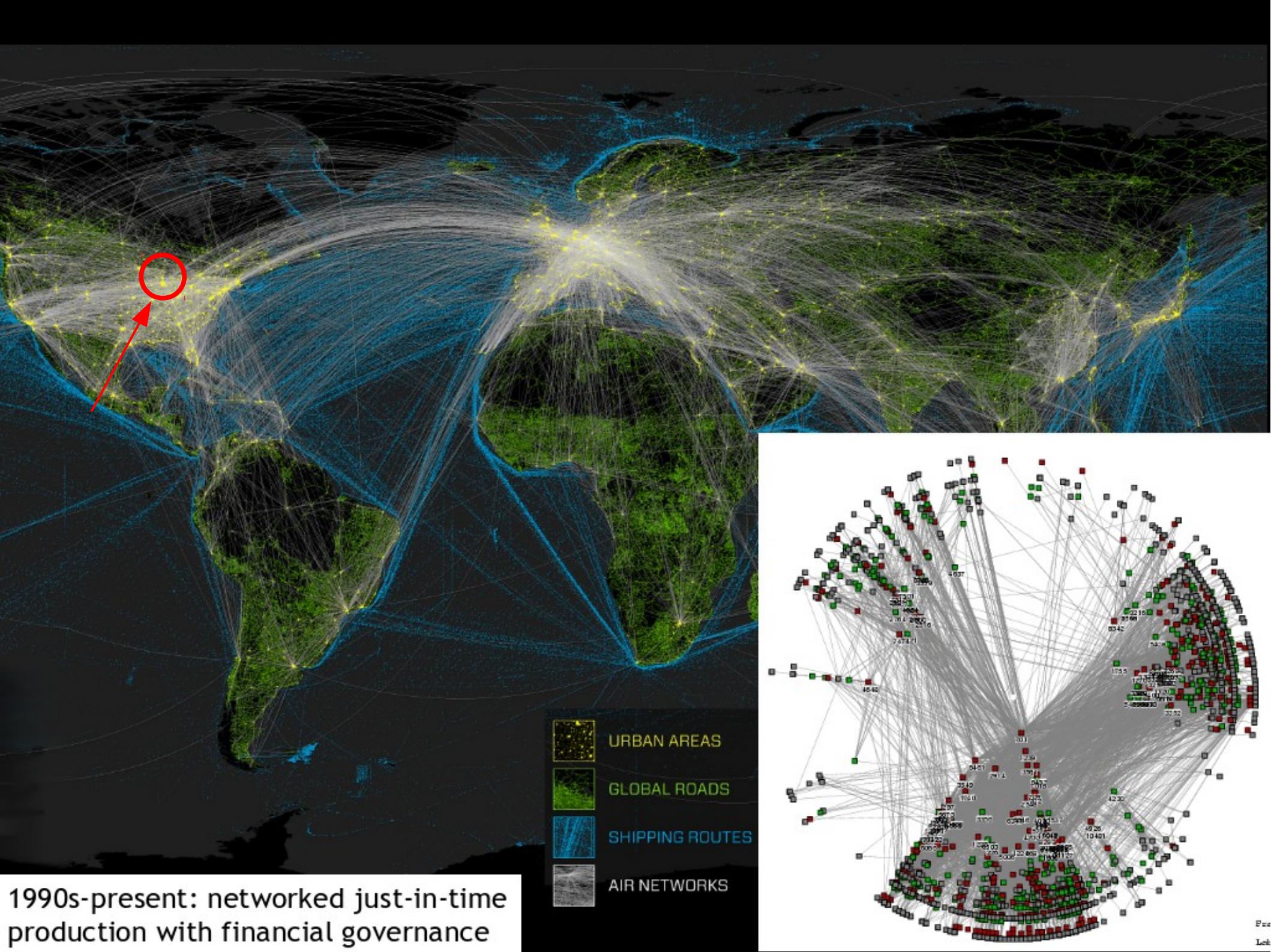


1990s-present: networked just-in-time production with financial governance

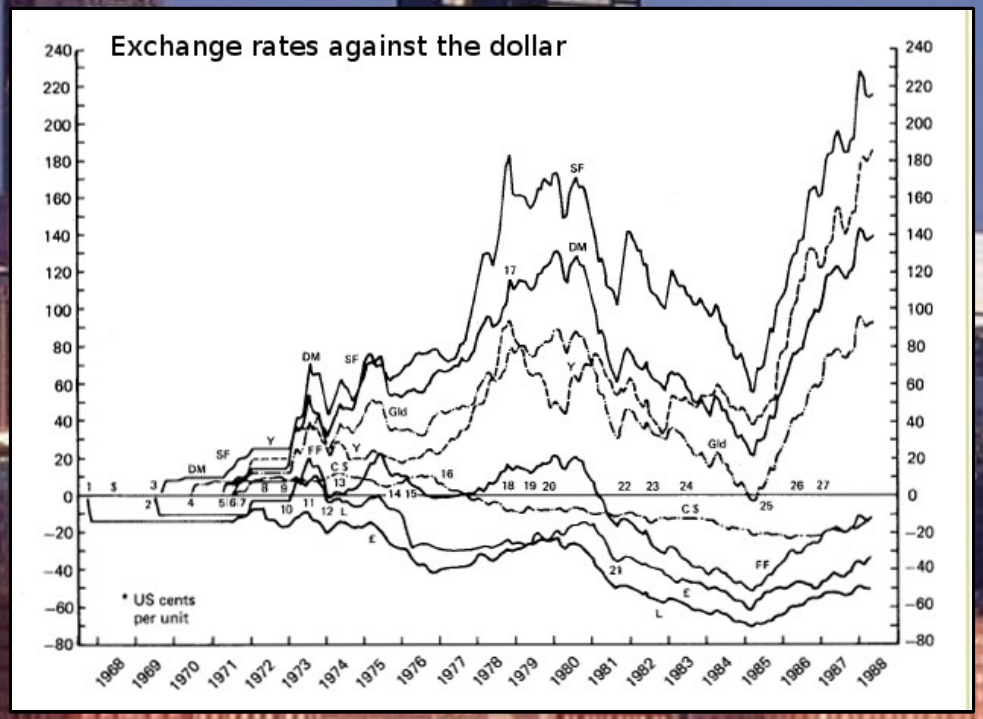


1990s-present: networked just-in-time production with financial governance

A transport map overlaid with a communications map



1990s-present: networked just-in-time production with financial governance


Exchange rates against the dollar
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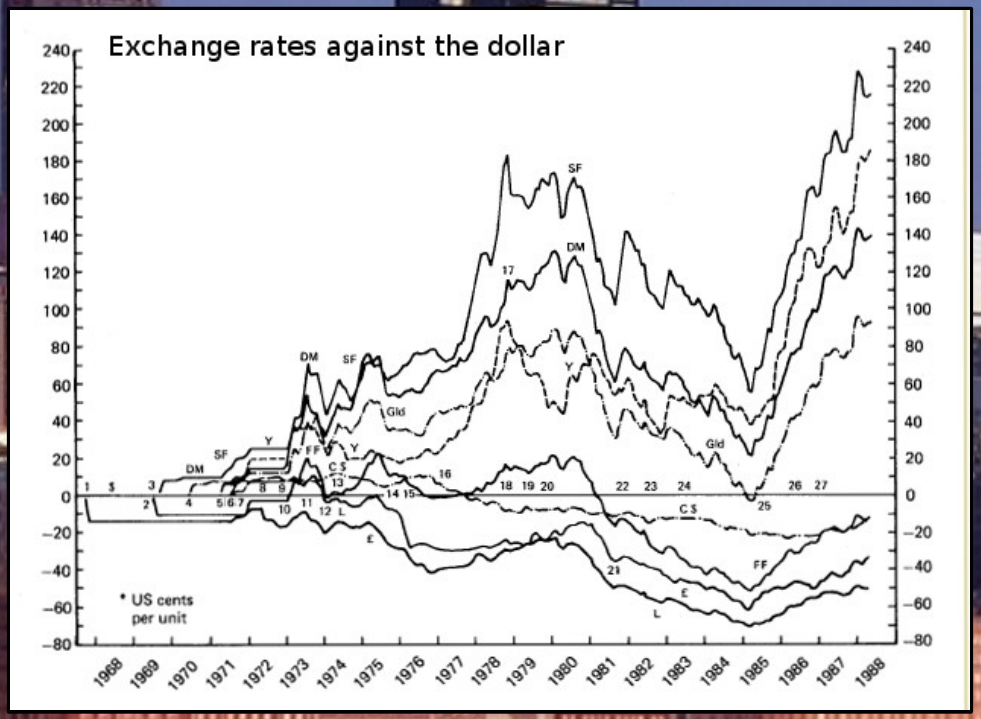
Milton at the Merc!

Friedman inaugurates currency futures, Chicago Mercantile Exchange, 1972



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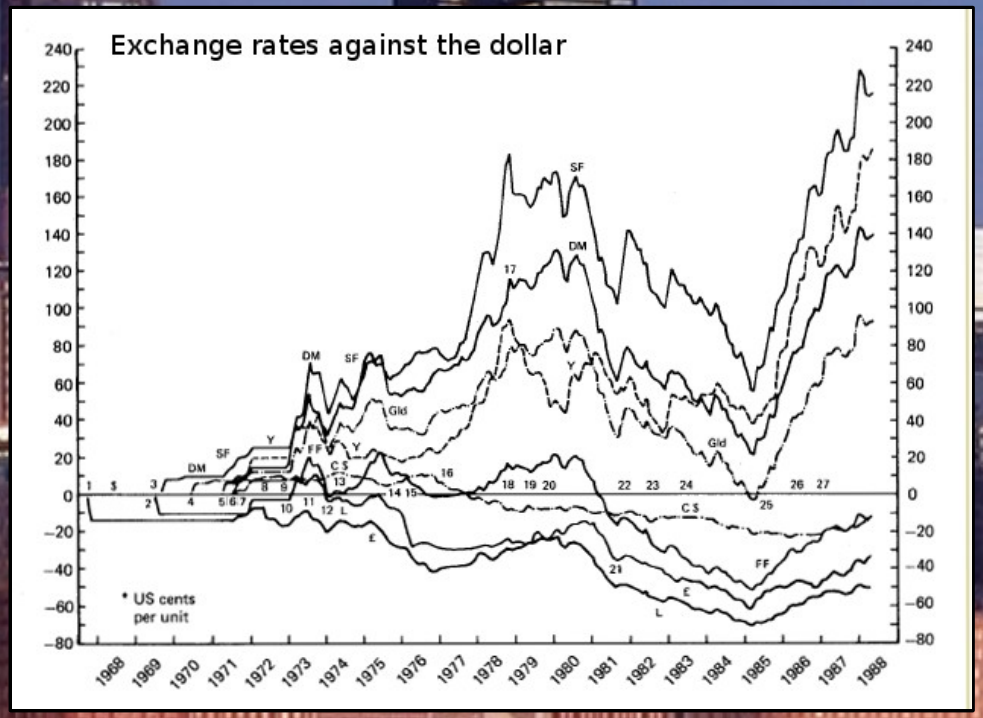


Arpanet goes online, 1969

Invention of microprocessor, 1971

Bretton-Woods currency system collapses, 1971

NASDAQ – Securities Dealers Automated Quotations, 1971

Reuters Monitor –first networked currency trading system, 1973

SWIFT –Worldwide Interbank Financial Telecommunication, 1973

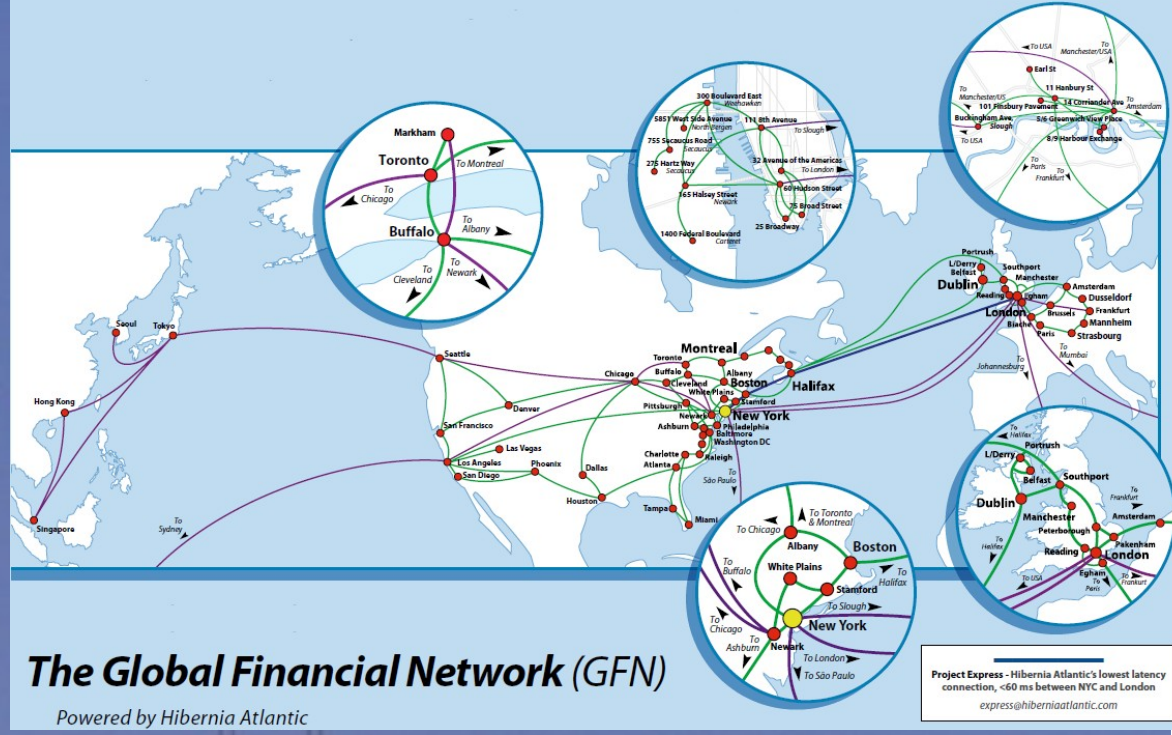
CBOT Options Exchange, founded 1973

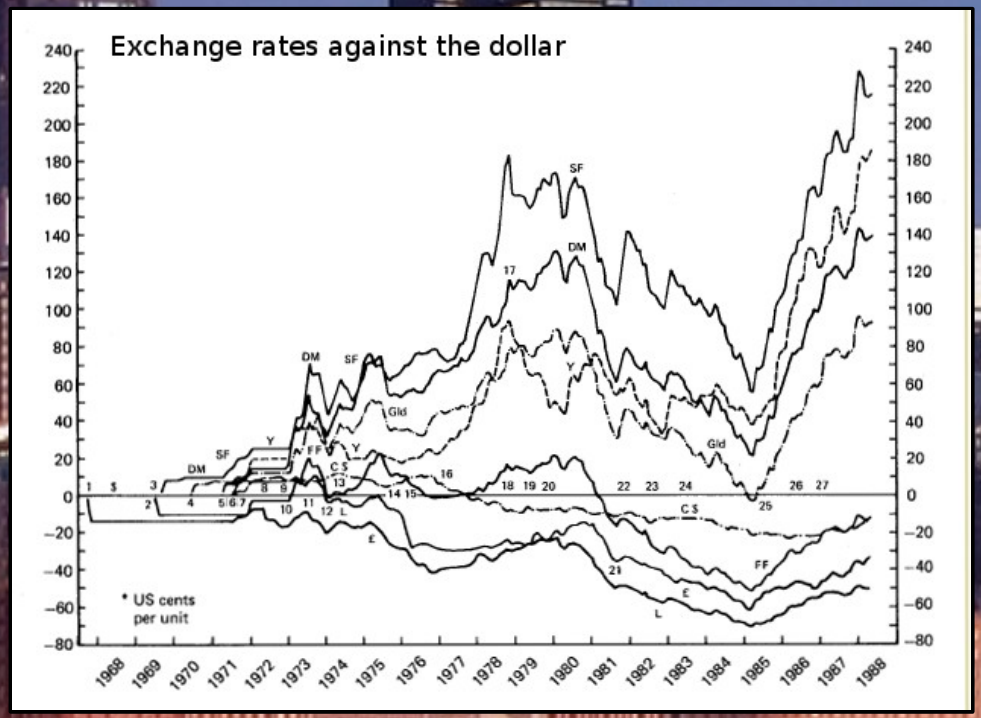
OPEC oil shock, 1973
petro-dollars recylced throughout global financial system

Launch of Altair personal computer, 1975

“Volcker Shock”: prime rate rises to 21% in 1981
Third World debt crisis, US attracts world savings

“Fall of the Wall” - world opens to neoliberal capitalism, 1989





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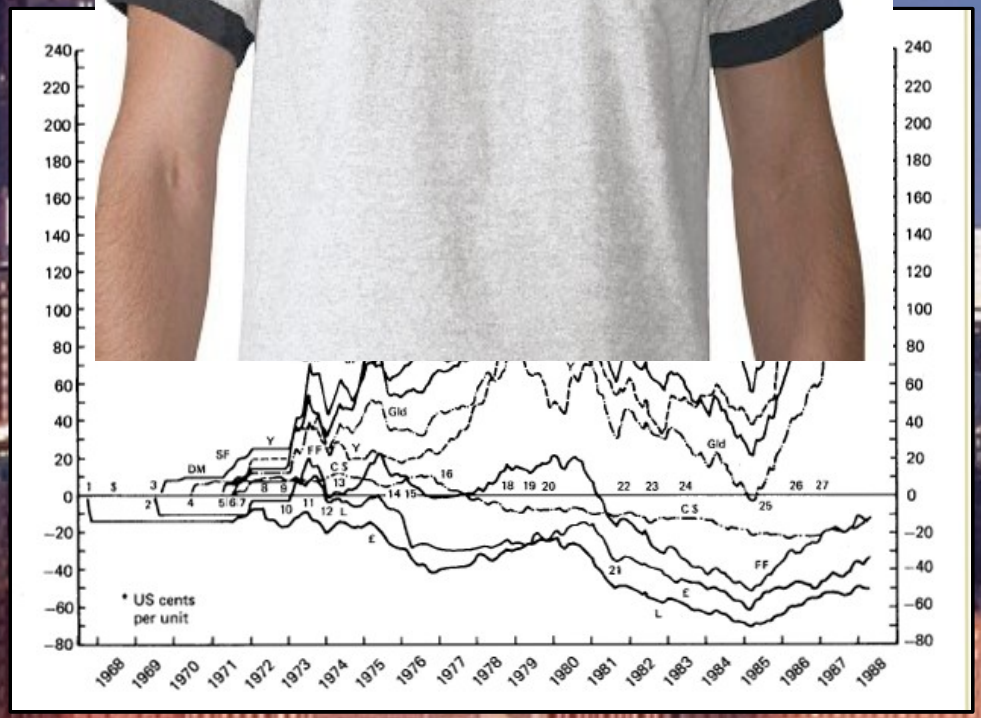

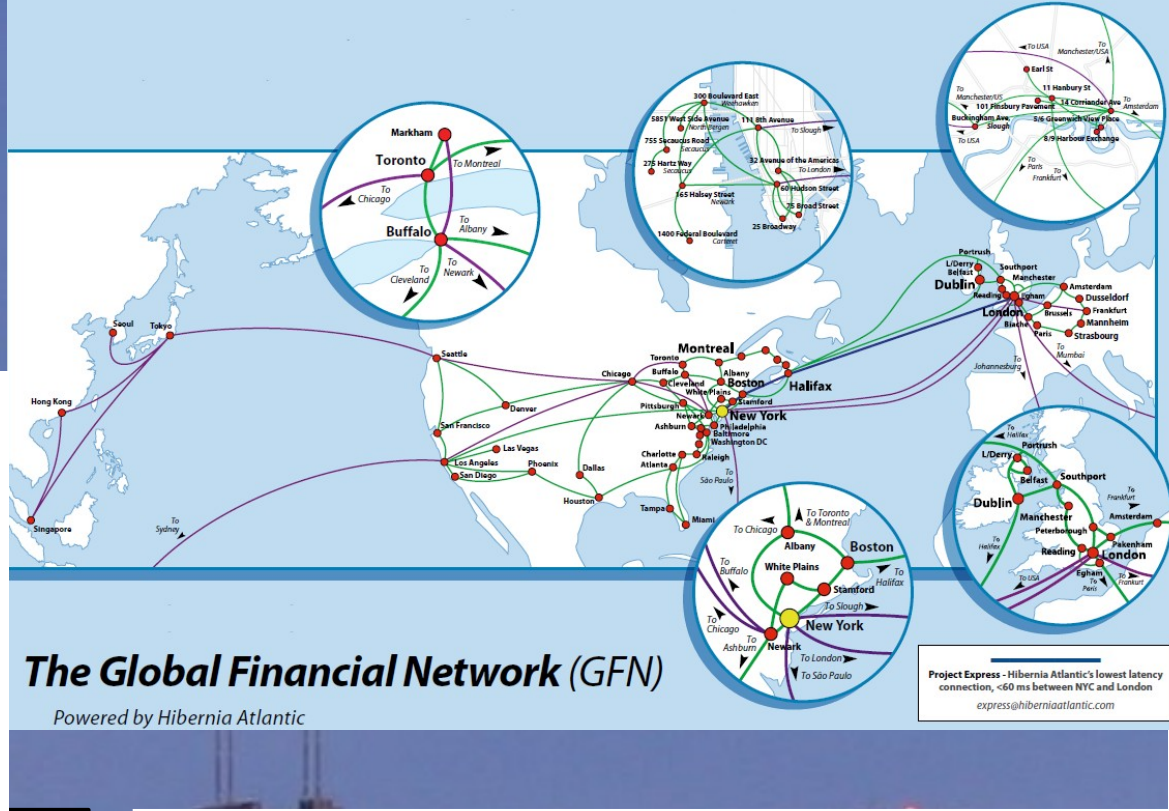

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$C(S,T) = S\Phi(d_1) - Ke^{-rT}\Phi(d_2)$
$d_{\pm} = \frac{\ln(S/K) + (r \pm \sigma^2/2)T}{\sigma\sqrt{T}}$

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* US cents per unit
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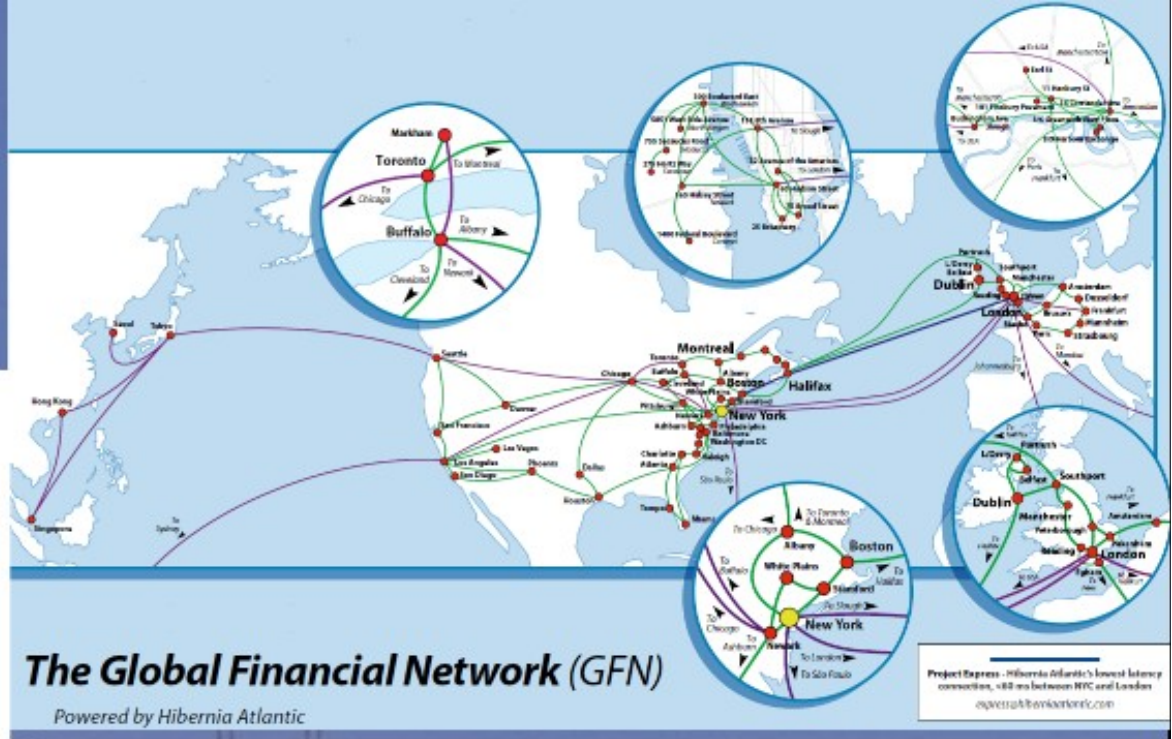
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The Global Financial Network (GFN)
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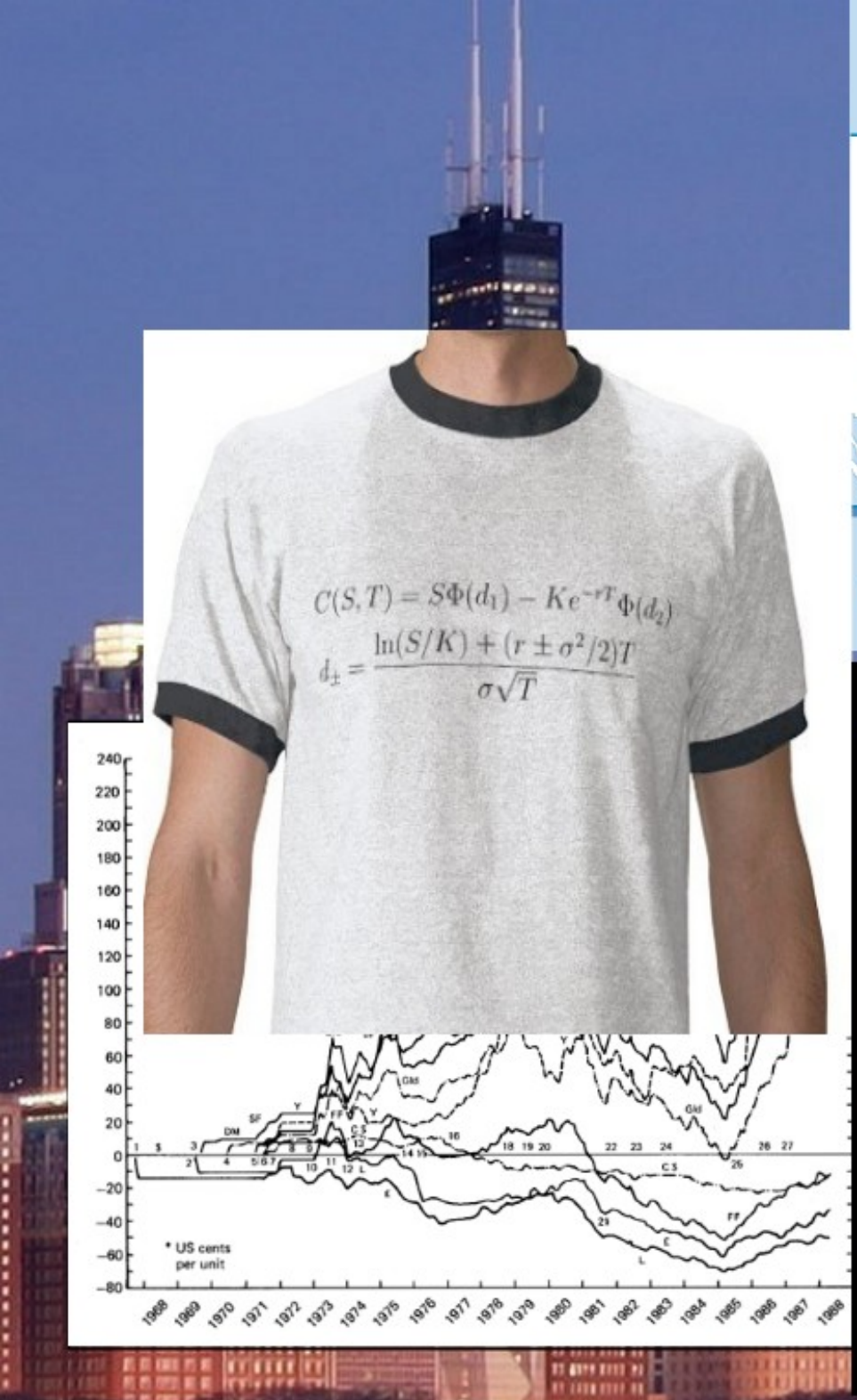
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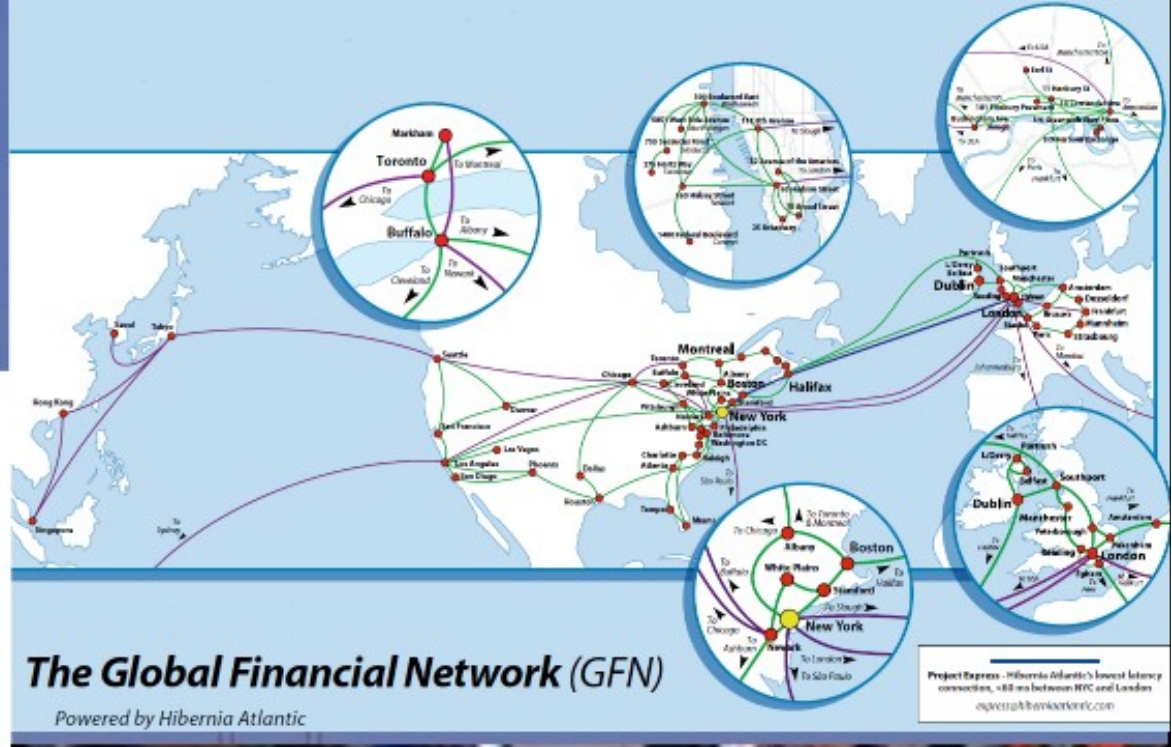
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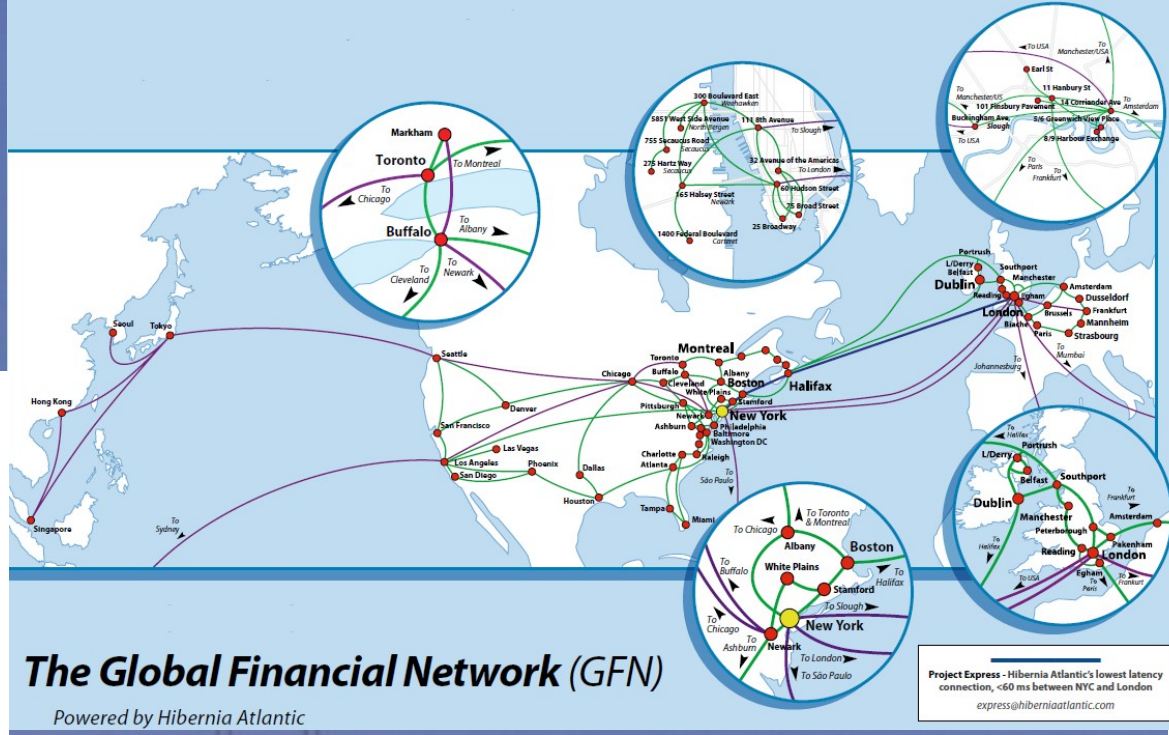
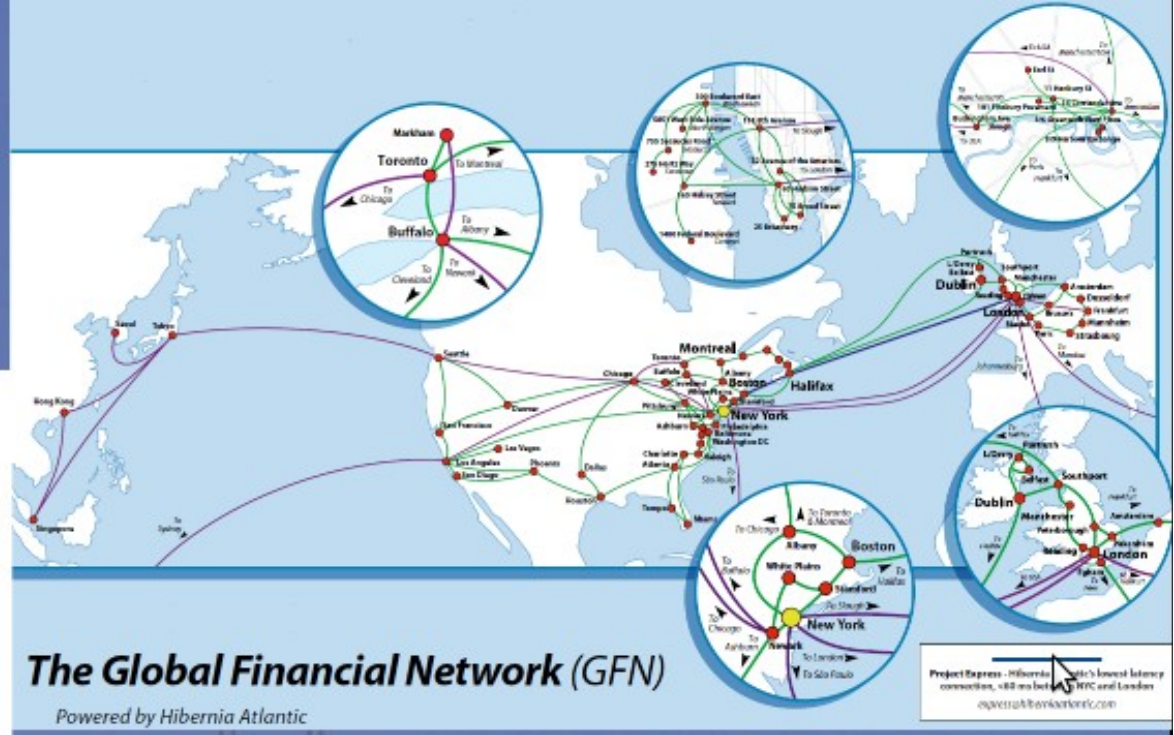


Fischer Black and Myron Scholes
inventors of the option-pricing formula
(published in Chicago in 1973)



The Global Financial Network *(GFN)*

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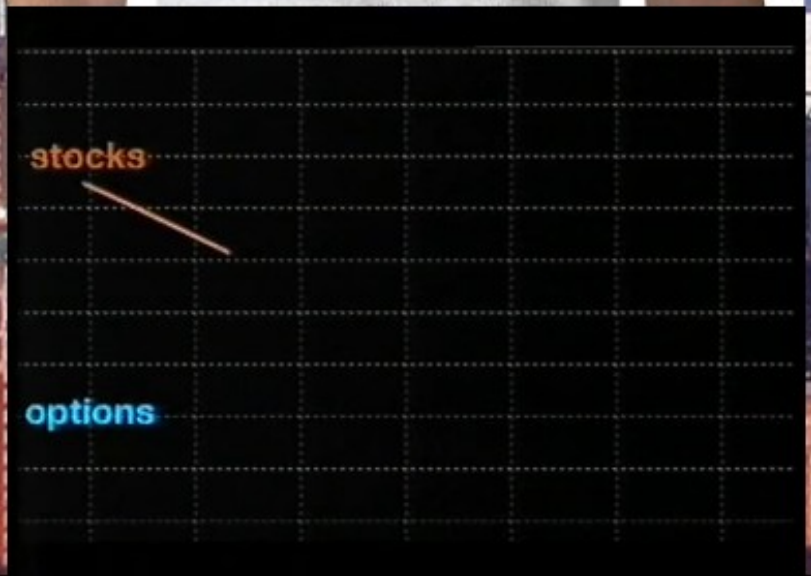

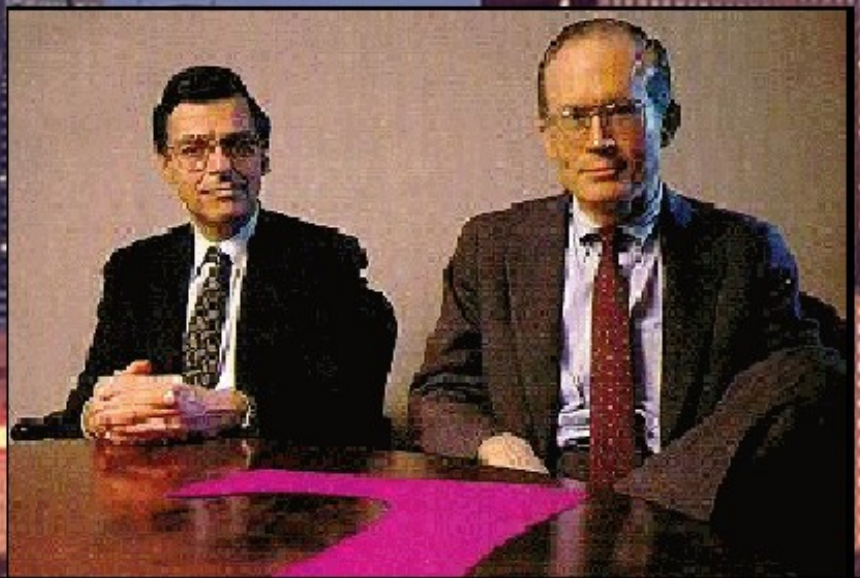

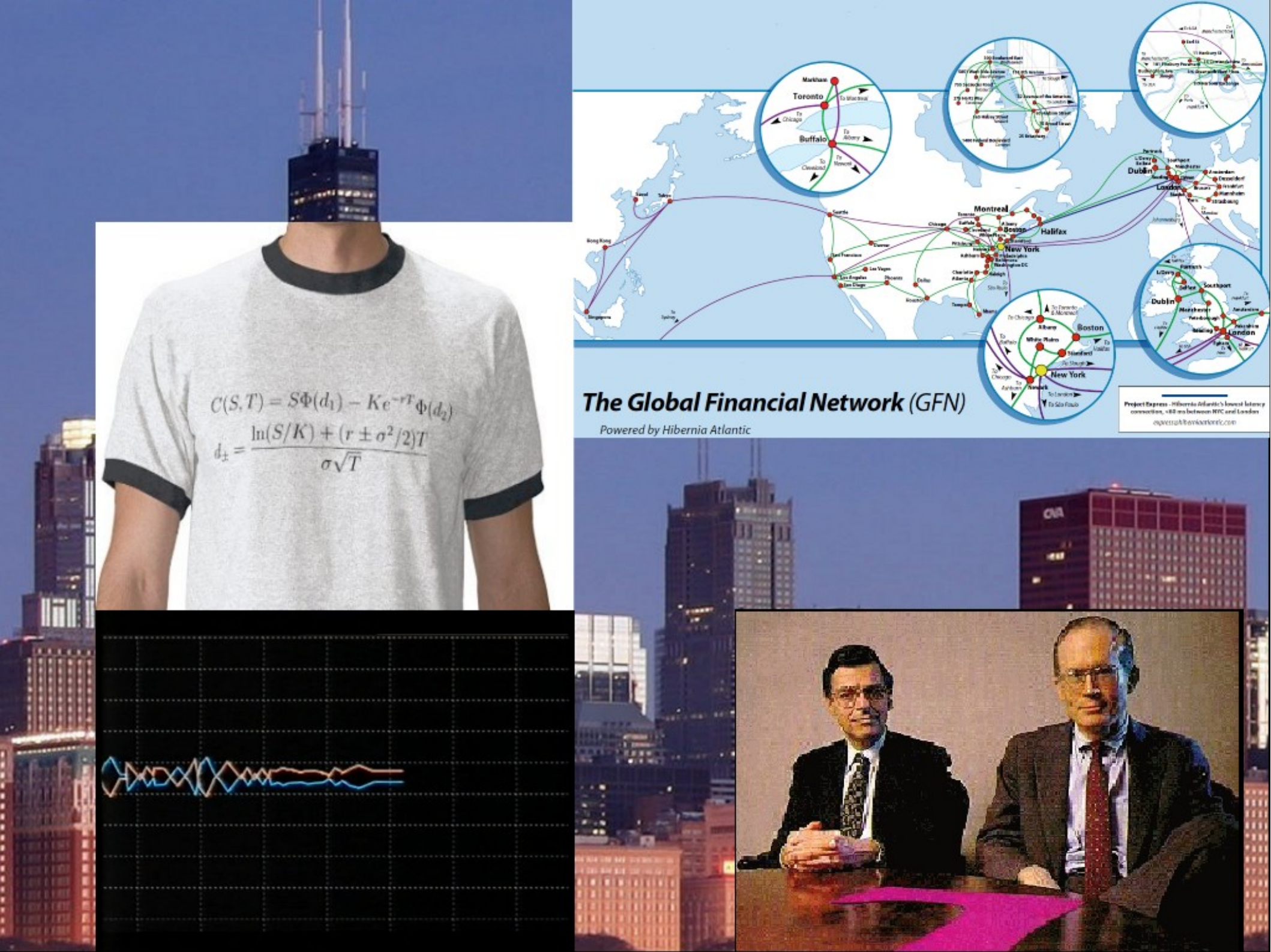
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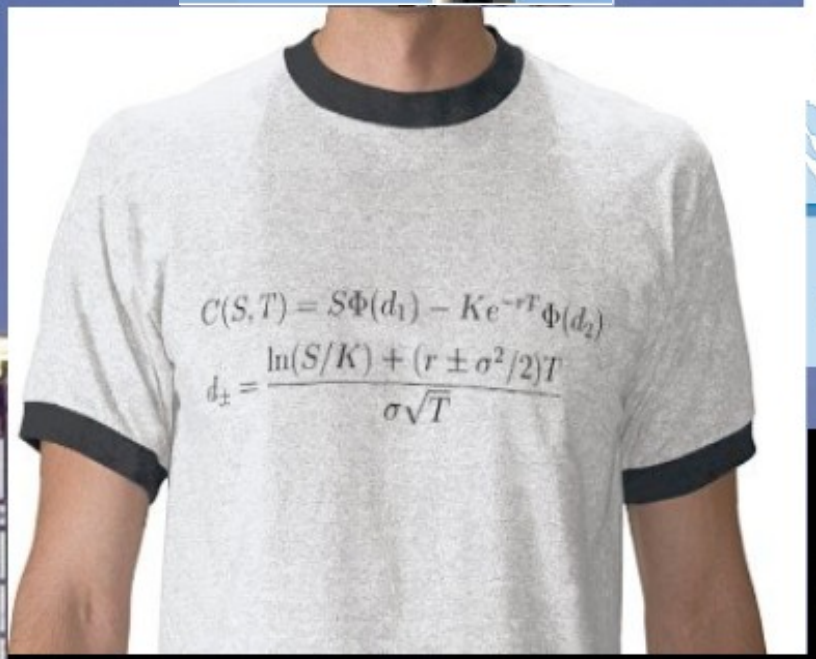
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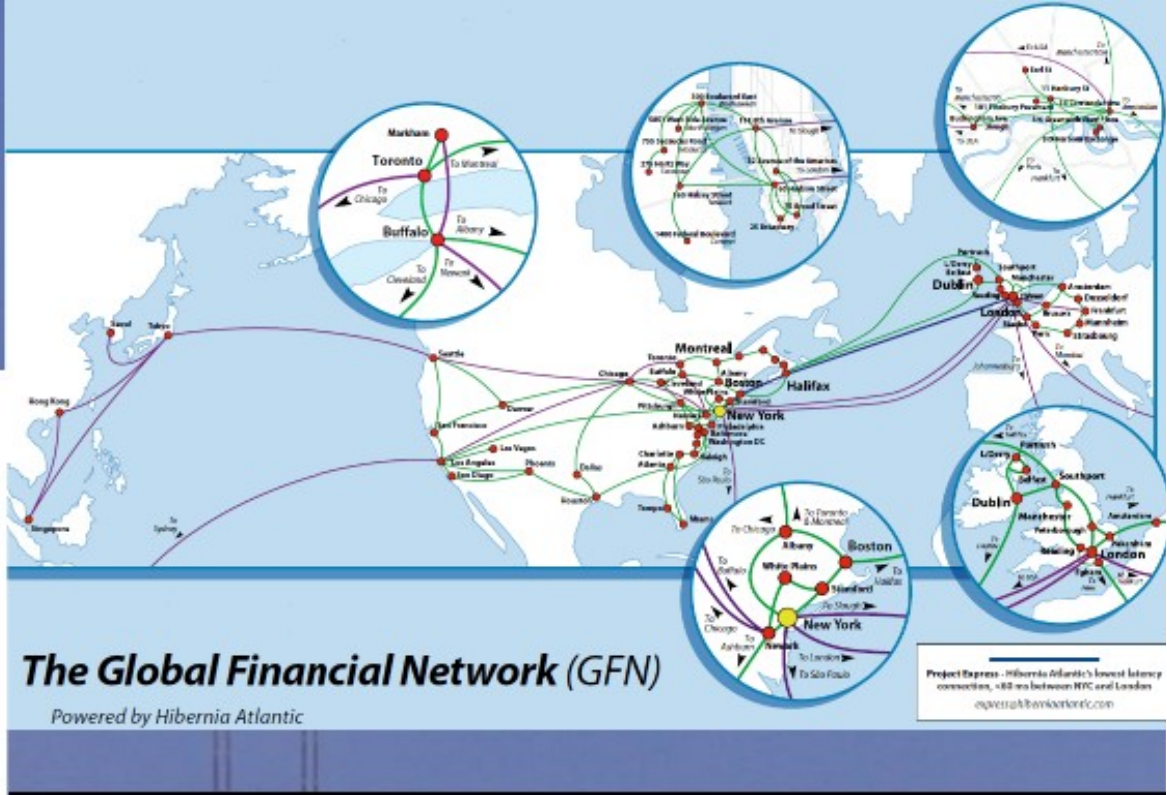
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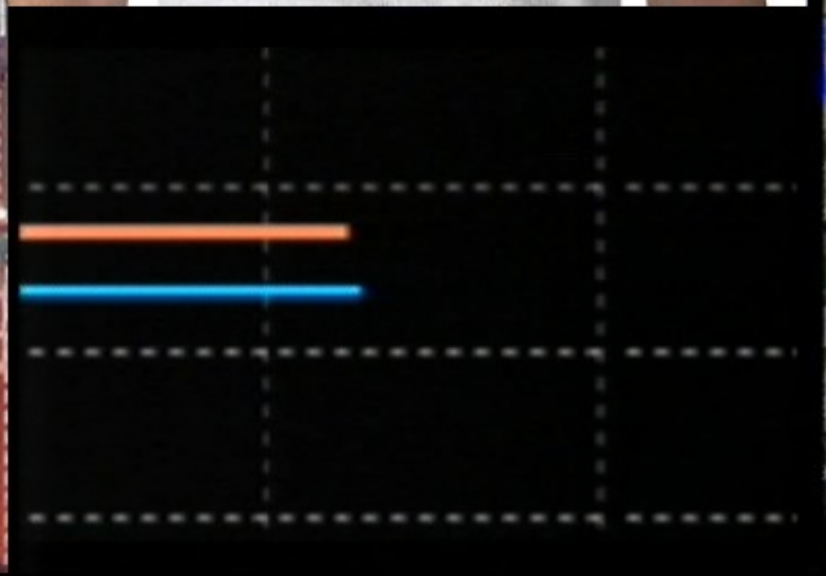
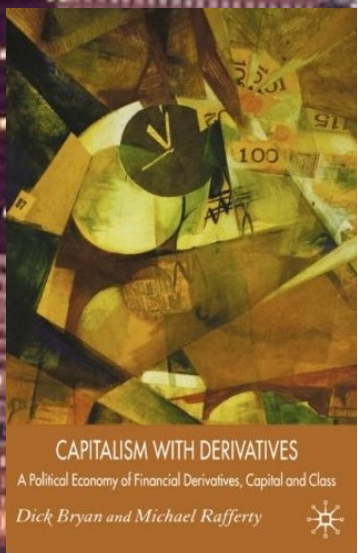
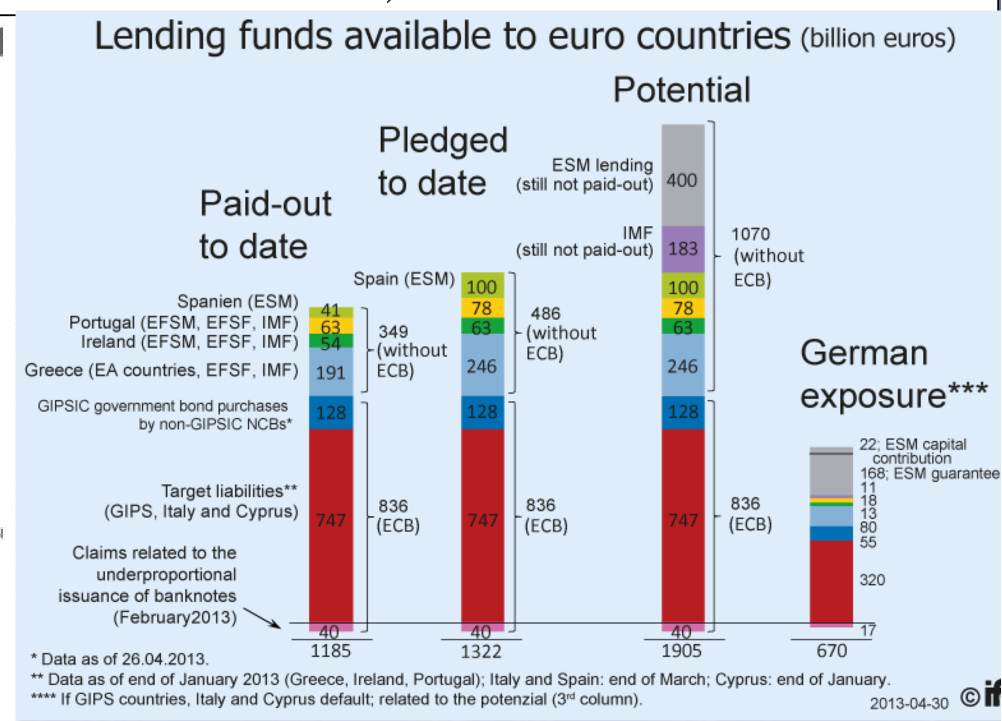


1. Floating exchange rates require labour market flexibility as the mechanism of national economic adjustment to the vicissitudes of the global economy.
2. In the context of floating exchange rates, financial derivatives now anchor the global financial system in a role comparable to that played by gold when exchange rates floated freely before the First World War.
3. In performing this anchoring role, derivatives take on the characteristics of global money. They are money that transcends the conventional national system of money.
4. The foundation for derivatives-as-money is not state guarantees, but a commodity basis. The last hundred years has not seen a shift away from a commodity basis to money, but the re-discovery of a new commodity basis.
5. The capacity of derivatives to compare (commensurate) all different types and localities of capital assets is imposing an intensified competition into capital markets, and thereby into all markets.
6. Derivatives generate demands for labour market flexibility. What are widely called 'neoliberal' policies with respect to labour can be associated directly with the ubiquitous impact of derivatives. Via the intensely competitive conditions derivatives create for capital, pressure reverts to labour as the primary area where capital can exert creative discretion in the pursuit of profitability.



"If you think it's time for governments to step in and save everything, you're wrong – governments don't rule the world, Goldman Sachs rules the world."




YOU ARE 99
NYPD
I AWOKE
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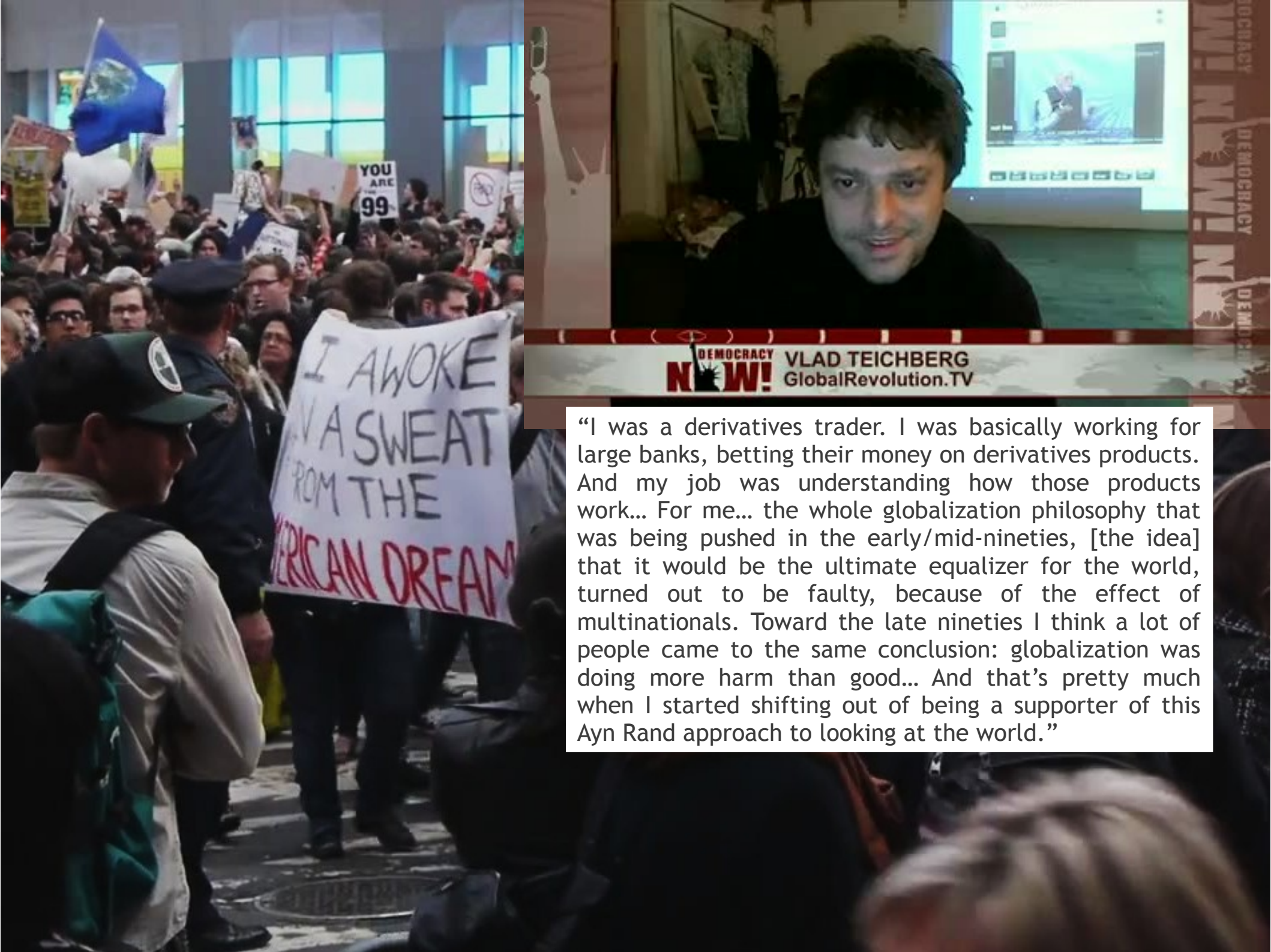
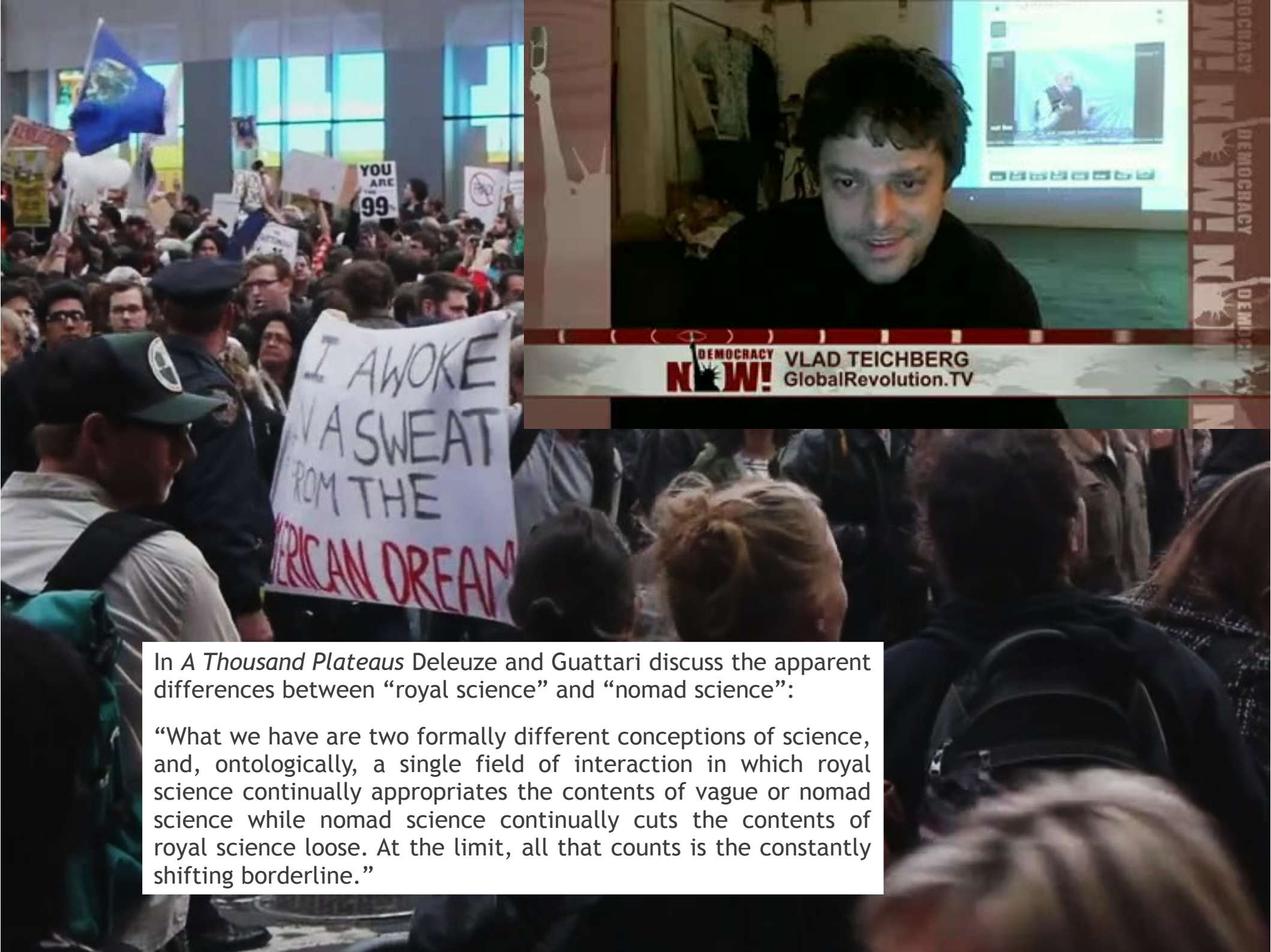


"I was a derivatives trader. I was basically working for large banks, betting their money on derivatives products. And my job was understanding how those products work… For me… the whole globalization philosophy that was being pushed in the early/mid-nineties, [the idea] that it would be the ultimate equalizer for the world, turned out to be faulty, because of the effect of multinationals. Toward the late nineties I think a lot of people came to the same conclusion: globalization was doing more harm than good… And that's pretty much when I started shifting out of being a supporter of this Ayn Rand approach to looking at the world."



In *A Thousand Plateaus* Deleuze and Guattari discuss the apparent differences between “royal science” and “nomad science”:

“What we have are two formally different conceptions of science, and, ontologically, a single field of interaction in which royal science continually appropriates the contents of vague or nomad science while nomad science continually cuts the contents of royal science loose. At the limit, all that counts is the constantly shifting borderline.”