Finance and the Technology-Trade Nexus

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"...it is rather like trying to connect two railroad systems with different track widths."

Felix Rohatyn

**Introduction**

In a paper published earlier in this Journal, we used a simple analytical framework to examine recent changes in the world economy, with particular reference to trade, information flows, innovation and technology. We used this scheme to analyze policy shifts from the point of view of both firms and governments, and to evaluate various alternative strategies that have been suggested by policy-makers in order to cope with these new circumstances. After assessing the dominant orientations of governments towards market liberalization or hawkish trading blocs, we concluded that a middle strategy - one based on negotiated access to new markets, technologies and capital - was much to be preferred. And we suggested ways in which such a strategy might be implemented.

This work was broad-ranging in scope, yet it was not sufficiently comprehensive. It restricted itself to what economists call "the real side" of the economic system. That is, it dealt with the "real" variables describing the process of production, trade in goods and services, and the whole set of material and technological operations that underpin it. The monetary and financial side of the economy was all but ignored.
Our analytic alibi was that it has become something of a convention in economics to separate the exploration of the international economic system into two components on the assumption that "real" and "monetary" variables are determined independantly, and that therefore it follows that they may be analyzed (and perhaps regulated) separately. Consequently, our analysis dealt with the so-called real variables of the economic system as if money and finance were neutral.

This analytical shortcut proved to be useful at the time because it enabled us to underline some important factors that had not received sufficient attention, such as the Schumpeterian economic adjustment process, the usefulness of meso-level analysis, the centrality of economic development blocks and growth poles, and the strong case that can be made for a strategy of "negotiated access" in the context of emerging trading blocs.

But, as is obvious even to those who are superficially familiar with the structure of the balance of payments, the two sides of the economy -- the real and the monetary/financial -- are in fact integrally interconnected. The monetary/financial system plays a number of key supporting roles in the process of economic development. Failures in any of these roles may not only distort, but they may actually hinder or stunt the economic development process. Conversely, events on the "real" side of the economy have echo effects on the financial and monetary side. Indeed, an intricate and complex dynamic is at play at the interface of the real and monetary/financial economies, and this interplay must be taken into account in any practical analysis of the international and domestic economies. Clearly, it is unreasonable for policy analysts to deal with only half of the economic reality of interest.
The problem requires our urgent attention because of the recent developments that have transformed the world of finance over the last decade. The extraordinary growth in the size of transnational financial flows, the computerization of the money and payments systems, the new financial instruments, the emergence of computer-mediated global financial markets, etc. have all 'conspired' to create a new world order of finance.\(^6\)

The volatility generated in the currency markets by this explosion of international financial flows was sensed very early on as being potentially capable of inflicting sufficient damage on national economies that it was proposed, in 1982, by Nobel-prize winning economist James Tobin that 'throwing sand in the wheels' of finance would be welfare-enhancing.\(^7\) He proposed, at the time, a tax on international currency transactions to discourage short-term speculation and to limit fluctuations in currency values.

Ever since the Great Crash of 1987, concern has grown sharply. It has become clear that financial markets around the world have become synchronized. Financial crises have hit every continent and thrown many national economies into turmoil. The world's financial institutions such as the World Bank or the International Monetary Fund, which were designed after the Second World War specifically to stabilize the global economy, now appear to be incapable of ensuring such stability.\(^8\) The G-7 leaders and officials in most of the other important world economic fora have therefore put the reform of international monetary institutions high on their agenda. Proposed mechanisms, like the Tobin Tax on international currency transactions or currency bands, are now openly and hotly debated.
Our purpose in this paper, which is a companion piece to our earlier article published in this Journal, is to focus on the monetary/financial dimensions which were excluded from our earlier analysis with an eye towards enriching our perspective on the dynamics within the technology-trade nexus.

In the first section, we briefly sketch the rough contours of the evolving financial/monetary system. In the next section, we examine the degree to which global integration of the financial world and the links among financial systems have implications for the real economy. This enables us, in the subsequent section, to critically examine some of the views that are in good currency on the dynamics of this trade/technology/finance nexus. In the concluding section, we sketch some of the policy implications that might be derived from our analysis, and suggest some directions for future research.

**The Foundations of the Financial System**

Money has long been a simple medium of exchange. However, as we have moved towards a more complex socio-economy, many additional and different roles of money have become important. Over and beyond serving as a medium of exchange, money and finance now also serve as a fungible store of value, a medium of credit and debt, a flexible asset, an instrument of speculation on asset prices, and, with the emergence of electronic money, an "information product". Just as information technologies have increased (and continue to increase) the fungibility and flexibility of money, so have they dramatically influenced the role of money and finance.
The Evolving Role of Finance

A financial system in toto is a set of institutions, rules and conventions linking savers and investors, the suppliers of capital to the demanders. Its role is to facilitate the mobilization and deployment of financial resources and to transform, for the benefit of savers, risky securities into quasi-riskless assets. Without it, investors would be limited to self-financed investments. Thus the financial system permits the choice of technique and scale, and thereby promotes flexibility. Flexibility, in turn, in the presence of prudential regulation, increases the pace of wealth creation.10

Local, regional, national and transnational financial systems have been in existence for a long time. Bills of exchange had emerged as a popular financial instrument by the Middle Ages, and banking had already been in place by the 13th century. Capital markets, developed first at regional European fairs, were already involved in substantial transnational operations by the 16th century. Indeed, at that time, "Antwerp dominated Europe's transactions in bills of exchange and other credit instruments, such as demand notes, deposit certificates and the bonds of states and towns. This exchange had at one time 5,000 members."11

By the 17th century, one can point point to the rise of creative intermediation between savers and investors,12 and in the 18th century, sophisticated forward and futures contracts were traded -- even in the backwoods of North America. Indeed, there was an active North American market in bills of exchange amongst different cities in Canada and New England at the latter part of the 18th century.13

The 19th century revealed a major leap forward when money and finance became truly omnipresent
and transnational networks of finance were generalized. Already, then, by the 1830s -- an era when issuance of paper currency was still determined by the initiative of individual bankers -- the deleterious cascading effects on economic development of the excesses generated by the financial system could be noted.\textsuperscript{14}

The truly modern financial system, with its four specialized pillars - commercial banks, insurance companies, the securities industry and the thrift institutions -, took shape in the 19th century, and the modern regulatory controls on the monetary and financial institutions emerged soon after as a reaction to the crises that occurred from the mid 19th century to the Second World War. But the truly extraordinary explosion and internationalization of finance is a phenomenon of the post World War II era.

As is well-known, world trade increased dramatically after 1945. Indeed, while world industrial output grew by roughly 200% between 1950 and 1975, world trade grew by 500%. As a result, there was a growing need of finance.\textsuperscript{15} Internationally, gold had long served as the main instrument of international settlements,\textsuperscript{16} but, concerns developed during the 1950s and 1960s as it was anticipated that the production of gold would prove incapable of keeping up with the pace of international trade growth. Further concerns about the use of the U.S. dollar as permanent key currency were also articulated.\textsuperscript{17} These concerns, pointing to the need to find new ways to deal with international credit, proved ill-founded. The capacity of the budding world financial system to generate new instruments was astounding.\textsuperscript{18}
As boundaries between institutions and countries slowly began to dissolve, and financial instruments (such as options, futures and swaps) emerged, financial flows came to be increasingly triggered by speculative motives. And since flows of paper claims are much more sensitive to variations in (and expectations about) relative interest rates than trade flows are to relative prices, this internationalisation of finance generated a heightened degree of international interdependence and established an unequivocal dominance of foreign exchange markets by speculative financial flows. A consequence of this development has been a growing instability and fragility of foreign exchange markets in a world that is gradually shifting toward a flexible exchange rate regime. This has increased the likelihood of massive asymmetric impacts of finance on the real economy at both the national and global levels. Financial and monetary flows have become a key determining force on the rate of interest and, consequently, on the process of real investment and real capital accumulation.

The World Financial Structure

As recent world events and currency crises (Mexico, South East Asia) have shown, not only is the global economy truly one of deep interdependence and dominoes but, the internationalization of finance has not proceeded homogeneously across nations and across financial instruments. It is undeniable that a fairly centralized New International Financial System (NIFS) has come into being. This is due to three families of reasons that are related to the importance of economies of scale and increasing returns.
First, the internationalization of finance has accelerated the dissolution of boundaries between different types of financial institutions, has speeded the entry of foreign firms into national financial markets, and has hastened the deregulation of national financial markets. The consequent increased competition was a major stimulus to the creation of new financial instruments, but it also led to a more extensive use of information technologies. Given the important scale economies involved, centralization ensued.  

Second, the global manufacturing and production systems have become more physically dispersed geographically and decentralized organizationnally in order to produce the requisite variety of products and services and to react with the flexibility and speed that are required in a rapidly changing environment. As a result, a premium has been put on the development of the financial flexibility that is needed to coordinate this deconcentrated production. Again, because of economies of scale, the financial system has tended to become centralized.

Finally, given the fact that technological infrastructures are not evenly spread out, information and transaction costs across countries are neither negligible nor identical across time zones. Thus, given the importance of economies of scale in the information sector, London, Tokyo and New York have become key pivots of the world financial system in the different time zones.

But there have been countervailing forces that have prevented the epiphany of a fully integrated world financial system, despite the existence of the technological capacity to create one. These forces are of three types: (1) the "home country bias" (on the part of investors) that has balkanized the financial
markets, (2) the maze of *de facto* different national regulations that increasingly constrained financial institutions as financial markets were *de jure* deregulated, and (3) the different tax systems that have generated different sets of national rules for savers and investors, and that consequently have contributed to the perpetuation of localized financial markets and even conferred a new centrality of sort to a few of these places.

This dual process of globalization and balkanization has resulted in a global financial structure that is loosely integrated in layers of financial places. At the top, are some truly transnational financial forums (Tokyo, London, New York), the vocation of which is global and universal, even though some of these places have developed relative advantages and important complementarities. Next, there is a layer of continental/regional or specialized financial places (Hong Kong, Frankfurt, Chicago) that perform transnational functions but on a more restricted scale and that have quite striking differences in their *modus operandi*. These financial places circle in the orbit of the first-tier financial places but perform their main functions within a certain, more particular, socio-political sphere. A third layer of national financial places (Shanghai, Paris, Toronto) perform important national intermediation functions albeit within a much more restricted range of activities. Such places are only loosely integrated with each other and provide some sort of "security zone" for national firms of sufficient size to require a major financial place, but not important enough to navigate in international waters. Finally, there are many important sub-national financial places (Lyon, Shenzhen, Montreal) that perform crucial, but limited, intermediation functions. Such places may depend on particular socio-cultural factors, on political action by region-states, or on the particular local needs of technology or industrial districts or sectors.
To the degree that these layers of financial institutions functionally overlap, they compete somewhat directly, and are loosely integrated. Their "relative" independence helps maintain some form of multistability in the world financial system at an efficiency cost that is not necessarily high, as we shall see later.\footnote{32}

**Intermediation Mechanisms**

In order to understand the reasons behind the evolution of this particular edifice, and to comprehend the nature of the different roles that these financial fora play, we must delve into the nature of those intermediation mechanisms that purport to transform risky investments into riskless assets for savers, or, conversely, that satisfy the demands of risk-averse savers with demand deposits and insurance policies by using risky primary securities issued by firms.

Financial institutions intermediate between individuals. That is, they take deposits from some individuals and make loans to others. They do so for many reasons. (1) Because direct financing does not allow sufficient *diversification and risk-sharing*. In this context, the more advanced an economy is and the more additional independant risks that can be aggregated, the greater the scope for financial intermediation. (2) Because intermediation economizes the *monitoring costs* of outside finance. One intermediary can monitor a firm on behalf of all shareholders. In such a case, intermediation is little more than delegated monitoring. (3) Because intermediation serves as a *mechanism of commitment*. External finance agencies not only provide access to a much greater pool of financial resources than is accessible to an individual firm but they may forge tangible commitments that may lead financial
intermediaries, on the one hand, to be more willing to engage in corporate rescue and, on the other, firms to be more willing to invest and perform more effectively because of this partnership.  

Different national economies have designed different combinations and forms of institutions in order to deal with the underlying problems that are associated with financial intermediation, such as imperfect information, moral hazard, and so on. The differences between the American, German and Japanese financial systems illustrate the point. The American system is dominated by the central role of financial markets and by a banking structure that is more decentralized and competitive than it is in most other countries. The German system is dominated by a few large "universal banks" (banks that are engaged in both commercial and investment banking) that can hold equity in firms and vote the shares of customers. The Japanese system looks like a composite or amalgam of the other two and has recently been evolving rapidly. There were efforts to limit the control of large banks, there was a growing role of financial markets, and there was a major shift, over the last decade, from bank debt to bonds.  

If there are disagreements about the nature of the optimal intermediation mechanisms, there is none about the importance of such a financial filter. Economic historians have explored, in detail, the complex linkages between the nature of the financial system and the process of economic development. They have shown that the structure of the financial system has important direct, structural and oblique effects on the dynamic efficiency of an economy, even though it is not always possible to ascribe precisely calibrated effects to the financial system _per se_. For instance, the social system of through which "negotiated adjustment" is made and the social market institutions that
characterize the German political economy have helped diffuse innovative new organizational and institutional practices much faster than would have been the case in other types of political economies. Consequently, some of the benefits that have been ascribed to a reorganization of the German financial system might be more appropriately ascribed to the broader context. The German bank reorganization in the mid-1980s is a case in point.36

Finance and the Real Economy

As we suggested at the outset, there is a shortage of analysis attempting to deal jointly with the 'real' and financial sides of the political economy. Aliber's *The Multinational Paradigm* represents one such attempt. However, Aliber is satisfied to establish broad correspondances between the two worlds. Moreover, even though he puts key financial variables at the core of his analysis, his book is centrally concerned with the "real" economy. Aliber's central hypothesis is that a number of key choices by multinational firms are determined by the relative value of certain basic financial variables (exchange rate, interest rates, equity prices, and the 'Q ratios' of firms -- that is, the ratio between the market value and the book value of a firm). These, in turn, Aliber claims, depend on the relative real economic growth performance of an economy vis-à-vis other economies.

In Aliber's world, when a country experiences relatively rapid economic growth, international capital flows toward that country. Its currency appreciates and the relative costs of production decline. As the currency appreciates, it tends to become over-valued and the investment by domestic firms abroad increases. On the other hand, as relative costs decline, domestic production becomes more profitable,
anticipated returns on investment increase relative to those abroad, and this translates first into larger relative Q-ratios, and subsequently, into larger investment flows abroad. Such an increase in foreign direct investment would then tend, after a while at least, to mitigate against the overvaluation of the currency and reverse the trend in Q-ratios, and therefore would reverse the foreign investment flows.

In an electronic world that is characterized by perfect market conditions, such an approach may be useful in providing a perspective on global atmospherics. One might be able to explain the ups and downs of foreign direct investment and the timing of discontinuous reversals of financial flows between the U.S. and Japan, for instance. But when the relationships between the real economy and the world of finance are not characterized by highly stylized, perfect market conditions, as in the case of actual contemporary economies, the interface between finance and the 'real' economy becomes more complex.

The Relative "Perfection" and Autonomy of the Financial System

Even though much has been written about the epiphany of the well-integrated and quasi-perfect world financial system, there is a substantial body of evidence to indicate that the world financial system is far from being perfectly integrated. Financial systems do not perfectly reflect the state of real-world economies. They have a momentum and a logic all their own that allows the financial sector much relative autonomy from "reality". ³⁸ Much of this evidence contradicts many views that are in good currency. ³⁹
This point is very important. If the financial system were indeed well-integrated and perfect, it would adapt fully, speedily and perfectly to the requirements of the real economy. And the idea of an asymmetric impact of a 'putty-type' financial system on the 'clay-like' real economy would become a non-issue. We would experience a unidirectional causality from the real world to the financial world. This is not the case in our real-world economies.

Our argument thus proceeds in three steps. First, we try to provide evidence of imperfections in the world capital market and in the financial world. Second, we attempt to infer from this evidence that these imperfections are unlikely to allow the financial system to fully reflect the state of the real economy. And third, we derive from this the possibility of examining ways in which the "relatively autonomous" financial system might be the source or cause of external shocks that affect the performance of the real economy. In so doing, we restrict our attention to three major sources of imperfections.

At a first level of imperfection, we note that all financial systems are permeated by important information asymmetries that lead to adverse selection and moral hazard problems. Financial intermediaries are led to make the wrong choice of investment opportunities, and those receiving funding, having more information than the suppliers of finance, may exploit this advantage.40

However, this problem can be mitigated. To avoid being trapped in the adverse selection process, banks can impose credit ceilings. Moreover they may respond to the possibility of moral hazard by threatening to cut off credit lines in the future. In this sense, imperfections may be attenuated by
banks in debt financing. Equity markets have these same problems, but they are rather less well-equipped to deal with them. Some may argue that the shareholders have perfect information and that they may discipline their managers by selling their shares. But in reality the information is quite imperfect and the principal-agent problem is quite significant. As a result, it is not surprising that a large number of empirical studies have shown that actual stock prices diverge considerably both from the present value of dividend flows and from any market value derived from a reasonable valuation of the real assets.\(^{41}\)

\(\text{A second level of imperfections}\) has to do with the balkanization of capital markets and the consequent failure on the part of financial actors to take full advantage of the \textit{international diversification} of portfolios across countries. The phenomenon is not itself in question for it is well established that most corporate equity is held by domestic investors\(^{42}\). But the sources and causes of this phenomenon, and the impact that it has had on static and dynamic efficiencies in our economies, are questions that are fiercely debated.

French and Poterba have examined many of the plausible sources for this friction-type or inertia-type phenomenon and have concluded that it does \textit{not} appear to be ascribable to institutional constraints (such as tax on foreign income, transactions costs, and so on) but is rather due to investor choices and to the home bias of investors.\(^{43}\)

What is less clear is the size of the efficiency loss that is generated by this home bias. Most studies have tended to indicate that it might be much smaller than had been conjectured\(^{44}\). This is important,
especially when there are reasons to believe that this balkanization of capital markets may have some positive economic effect to the extent that it generates a greater stability, a form of 'multistability'.

*The third level of imperfection* is ascribable to the speculative aspects of financial markets. This feature has grown significantly over the past decades and has triggered an increase in the "noise" surrounding asset prices. In a regime that is overwhelmingly based on flexible exchange rates, the fact that some 85% of foreign exchange transactions are carried out for speculative reasons constitutes a fundamental factor of volatility. As a result, there is no reason to believe that, at any given point in time, the expected value of asset prices in the financial markets will approximate their real value. This 'speculative bias' has been reinforced considerably by the growing importance of institutional investors who focus their interest on short-term returns.

The dramatic increase in short-term capital flows, and the fact that the foreign exchange market in the United States must clear, on any given day, twice the amount of foreign direct investment experienced in one year, shows that these 'speculative' influences are bound to affect exchange rates and the interest rates in ways that dramatically influence the process of capital accumulation, and thereby the growth performance of the economy.

The Links Between the Financial and 'the Real Economy'

Even if it is established that shocks that originate in the financial world can distort or stunt the workings of the real economy, it is very difficult to make any general statement about these linkages
without first defining the optimal level of aggregation and disaggregation at which to conduct the analysis.

Globally, any major overhauling of the hierarchy of financial places (Tokyo, New York, London) would obviously modify the structure and performance of the world economy. But modelling realities on such a scale in order to isolate the net effect of the financial system would be an impossible task. It is also quite clear that any modification in the financial system in continental Europe (which is bank-centered) and in the Anglo-American world (which is market-centered) must have some impact on the process of capital accumulation. But the exact nature of this overall impact remains a matter of contention.\textsuperscript{46}.

At the level of national economies, one can be somewhat more precise. One can loosely specify a broad framework and speculate, in the manner in which financial columnists do, on the impact of the on-going restructuring of national financial systems on the economic performance of the country. Issues are even easier to pin down when it comes to sub-national financial systems and economies, but, at that level, the interference from the broad atmospherics that emanate continuously from the other three levels make any precise specification of the impact of local re-arrangements problematic, especially in a world of ever more open economies.

King and Levine have tried to tackle this problem by using a general endogenous growth model focused on innovation. They have explored the different ways in which the financial system might affect economic growth.\textsuperscript{47} Their model has a strong techno-economic flavour à la Schumpeter. One
may recall that Schumpeter himself - a former finance Minister in Austria before he went to Harvard - strongly supported the view that financial institutions played a crucial role in evaluating and selecting entrepreneurs, as well as in helping them bring new products to market. One may separate these roles into two broad functions: a creative discovery function (i.e. searching for and finding the right project) and the provision of powerful enabling resources once the right prospective project has been identified.

King and Levine have expanded on that intuition and have identified four separate roles that financial intermediaries might play: (1) the search for, and evaluation of, prospective entrepreneurs; (2) the mobilization of savings that are necessary for the financing of their projects; (3) arranging for the diversification of risks associated with such activities; and (4) the revelation of expected profits for engaging in such activities. Obviously, the better this work is done, the stronger and the more likely are the positive effects of the financial system on economic growth. In principle, this approach is promising, but it cannot as yet underpin detailed econometric studies. While one can find clear correlations in cross-country data between the indicators of financial development and the indicators of economic growth, the findings are indecisive when it comes to gauging causal links or any other measure of the relative importance of the impact that the financial system might have on the static and dynamic efficiencies of the real economy or on the rate of investment.

A rougher split, such as the one suggested above between the discovery and the provision functions of the financial system, might suffice for analytical purpose at this time. This split enables us to focus on the discovery function as being probably the most fundamental role the financial system can play.
On this count, the question is not focused on the search for a simple "financial development" aggregate measure or performance index derived from the relative importance of the resources allotted to it, but for a meso-economic, middle-level, gauge with which to establish whether certain types of financial systems might perform the discovery function better than others. This emphasis on the prior importance of the prospecting/discovery function is all the more important in a world where technology and innovation play a central role, for innovation is not simply a discontinuous affair but is instead a matter of continuous learning. The more apt therefore the financial system is at discovering and at monitoring progress, the better it would perform its key function.

Once the discovery/monitoring power of a financial system has been gauged, one might, as a secondary factor, gauge the differential "power" of financial systems in terms of their capacity to supply the needed enabling resources.

From the literature on intermediation mechanisms, some modest general propositions would appear to have emerged indicating that banks may perform the discovery/monitoring function and the provision of enabling resources function better than the financial market per se. But this proposition is fiercely contested when formulated at a fairly general level. It may turn out that this Manichean comparison (bank versus market) is too simplistic. One may require a much broader range of institutional possibilities to choose from, and a much sharper focus on meso-economic or sub-national realities in order to arrive at meaningful comparisons. It may turn out that banks are indeed providing more powerful and more accurate marksmanship than are financial markets. They may also provide higher quality services and more access for many small and medium-sized enterprises that would in
some circumstances be excluded from financial markets. But, the possibility of enriching, even more, the range of institutional possibilities should not be discounted, especially when countries and regions are facing such a diverse array of potential circumstances. The emergence of "corporate banks" which confine their activities to the multinational level and provide, at times, the equivalent of an in-house bank, is a case in point.52

The Dynamics of Trade, Technology and Finance

Multinational enterprises (MNEs) and the financial markets are the main *vehicles* through which the financial system influences the real economy. Banks are a sub-set of MNEs. The *channels* may be direct (through balance of payments and the investment process), structural (through organization, technology and location) or oblique (indirectly through a general or ambiant impact on economic performance). The impact zone may be the economy at the global, continental, national or sub-national level. One may combine these three dimensions into a transformation bloc acting as both a conduit and a filter between the financial system and the real economy. To fix ideas, we have mapped these different possibilities in the three-dimensional block presented in Figure 1.
Figure 1. *The Finance/Real Economy Transformation Block.*
The transformation bloc is an *analytical framework*, not a theory. A theory is "a set of relations that are sufficiently specified so that some conceivably falsifiable conclusions can be reached" while in an analytical framework is "the parameters are not sufficiently specified to lead to conceivable falsifiable conclusions". An analytical framework, however, provides an approach, the standardized language that is needed for theory-building. When we evoke the price mechanism (that is the idea that prices are determined by the laws of supply and demand) we are using an analytical framework. When we specify that the supply and demand relations are of a certain specific type, then we can draw a conclusion. The notion of analytical framework is akin to the notion of "vision" suggested by Joseph Schumpeter to characterize the first stage of any inquiry.

Our proposed framework here suggests that the three dimensions (vehicles, channels and impact zones) are in a process of constant interaction. Any significant change in one has echo effects on the others. For instance, a change in the relative importance of financial markets and multinationals as financial conduits would modify the relative sensitivity of economies to world events, alter the relative importance of the various different channels, and make some aspects of the real economy -- sectors, regions, districts or organizations -- more vulnerable than they would otherwise have been. In the same way, any government policy or any new form of interaction between technology and trade that would modify the organization, technology or location decisions (what we have previously described as a 'synergy space') would transform the structural impact of a given external shock within the adjustment mechanism. Finally, any modification of the rules of the game by political authorities (at the transnational, continental, national or sub-national level) can obviously deflect some of the impacts in a major way. These deflections are all the more important whether they originate in one
dimension or another because of the fact that the transformation bloc is an echo box. Consequently, there is no linear one-shot impact of any external shock or fluctuation through the transformation bloc. There are second, third and fourth-round reverberations within that three-dimensional echo box.

Any attempt here to theorize or formally model this transformation process would be premature for we do not yet have a sufficiently rich knowledge of this process. But one can explore the world of possibilities that it opens in order to put forward a few modest general propositions that might help carry the debate forward.

(1) Multinationals and financial markets, the two stylized types of financial institutions, might also be juxtaposed as networks versus markets. These two institutional conduits have very different impacts on the real economy. The financial free markets, imperfect though they may be, are simple enough institutions that are dominated by the price mechanism and their performance can thus be gauged rather easily even in the presence of market failures that require corrective government action. Multinationals are more complex. They represent network organizations that have both structural and strategic characteristics. They have a nationality, technical characteristics, core assets and competences, and different forms of power. But they also have strategies that translate themselves into organizational forms, schemes of integration and alliances, selected foci and practices, and tangible ways through which to structure and shape the company as a knowledge system.\textsuperscript{56}

If the financial system is market-centered, the likelihood is that the volatility is going to be greater,
the noise level higher, the decision-making shorter in sight, and the degree of competition fiercer. The shocks transmitted through this channel will be mostly unplanned, much like the October 1987 and November 1997 shocks. Their direct impacts are fairly dramatic and have the potential of spreading very quickly throughout the world economy in part because of the computer-mediated financial network. Yet, since turbulence has triggered the emergence of new financial instruments to facilitate hedging, it is quite possible to observe massive financial market shocks without any major structural or oblique impacts on the general economic performance. The resilience of the "real economy" is much greater than is usually presumed.

This has led to the celebration of financial markets as the preferred conduit. Indeed, it has been argued by some experts like Maxwell Fry that government interventions (beyond effective and prudential regulation and supervision) reduce the flexibility of financial markets and can only impair the process of financial intermediation. Others, however (and even the World Bank) do not see government interventions in financial markets in such exclusively negative terms. Financial markets are seen instead as being volatile and myopic enough to require some corrective guidelines in favour of some sectors and agents that would be discriminated against in the absence of such help. A more balanced conclusion, offered by Tony Killick, might be that a series of "preventive interventions and strategic withdrawals, in promotion of the well-functioning market system .. (would be) .. safeguarding the national interest, minimizing adjustment costs, responding to market failures and getting rid of regulations and other policy instruments which hamper the efficient working of markets"57
If the financial system is dominated by multinationals and banks, it becomes more difficult to predict what impact will materialize in the real economy. The direct and oblique routes are to a great degree, sanitized, as in the case of the financial markets. But the structural impact is a significant channel of impact. This is the case for two sets of reasons pertaining to the nature of the multinationals. First, important features of multinationals may create distortions. National specificities will have particular impacts on the way the world is scanned, on R&D performance, on management, on marketing strategies, etc. Secondly, multinationals have much scope for the design of strategies and for tapping into all the external economies generated by synergies, alliances, joint-ventures and so on. Indeed, the business strategy of multinationals is as important as the transaction costs or the locational constraints. This strategic dimension, while not immune to the usual logic of comparative advantage, is also very importantly affected by any number of proximities - cultural, commercial, political, historical, etc. This helps to explain the emergence of regionally-integrated, independently sustainable networks of overseas investments centred on Triad members that cannot be easily explained solely by locational advantages. Such "regional core networks" serve multiple purposes: to ensure access to key resources or markets and to leverage locational advantages.

(2) The recent drift toward a greater role for transnational corporations in the global trade and investment world has tilted the links between finance and the real economy. Their strategies of "regional core networks" are dependent on finance playing an evermore important orchestrating role within the MNEs. But other binding features, like idiosyncratic "business systems", serve as institutional regulators ensuring that certain ligatures, commitments, network preferences that are somewhat shaped by government-business relations prevail. These features may well play the same
stabilizing role for the multinational world, as home bias and balkanization do for financial markets.

The multinationals are developing "deeper, richer and qualitatively more complex" links among countries in which "financial management is probably the most global of the major corporate functions". This allows multinationals to intervene in designing their own configuration of organization, technology and location in a manner that best fits their plans and their sector. The structural impact has been extremely important. An illustration of differential impacts depending on the nature of the features and strategies of the multinationals might be a comparison between the operations of American and Swedish MNE. In the first case, globalization has provided an opportunity to reconcentrate a number of decentralized functions back in the home country; in the second case, globalization has triggered a dispersion of the multinationals into a number of quasi-independent networks which are only very loosely coordinated from the home country. These differential strategies translate into different global and transnational patterns but they have even more important impacts at the national and sub-national level where strategies translate into different dynamics of bargaining between the firm and the state that shape the way multinationals design their global-local strategies.

(3) The structural impact that is ascribable to the increasing importance of multinationals has been mainly visible at the sub-national or local levels. The "regional core networks" strategy has focused attention on sub-national spaces much more than on the other three levels. Often the national ethos has played an important facilitating role. As Wever and Allen argued in the German case, the nation-state still has an important environmental role as ethos-maker. But the extent to which sub-national
governments have begun to play a role in facilitating alliances and networks suggests also that one may begin to see new transnational-but-sub-national spaces become the new dominant pattern since regional states and regional core network designers may be able to bargain much more effectively and more easily at this level.65

Clearly, the relative importance of vehicles and channels is not independent of the impact zones. The typical fixation on national impacts has tended to sterilize the analysis. The net effect of a financial shock or of a technology/trade breakthrough may well be negligible at the country level while the impacts on sub-national spaces may be extremely important. Even if it may not be easy to partition or territorialize global effects, it may not be unimportant to recognize that certain channels and configurations (multinational vehicle, structural channel, sub-national impact zones) are becoming relatively more important in the transformation bloc.

* * *

In summary then, financial systems have developed a certain degree of independence from the 'real' economic processes. But the financial system has remained linked with the real economy and one may identify diverse avenues through which the financial process has an impact on the 'real' economy: (a) the financial process performs a discovery function for the 'real' economy; (b) it provides the 'real' economy with enabling financial resources; but (c) it may also have lateral effects on the 'real' economy through external effects, learning effects, and other indirect routes. We have had occasion to underline such lateral effects via the social ethos in the case of Germany.66
We have not systematically explored the many routes and all the possible paths through the transformation block. We have simply underlined, in a preliminary way, a few emerging trends or routes that are likely to become more important in the dynamics of the finance-technology-trade nexus.

Our conjectures suggest that:

(1) there may be a change in the relative valence of markets and networks as the central vehicles through which the financial process works in the information age; as electronic money, digicash and para-monies built on networks of trust thrive, one may anticipate a lesser reliance on financial markets and a greater importance given to networks. Estabrooks and Kelly have provided useful hints about the ways in which this might materialize. This may reverse the trend toward more reliance on markets that one has witnessed over the last decades.

(2) while one may anticipate important direct and oblique impacts of financial shocks, the former have been sanitized somewhat at the micro-level by the development of hedging instruments, and at the macro-level too much depends on speculative bubbles that are truly unpredictable and very much dependent on conditions of time and place; this very last point holds also for oblique impacts: these lateral impacts do not lend themselves to generalizations; one can however suggest that structural impacts through new constraints on the decisions about organization, technology and location (that is, on the OTL synergy space which we outlined in our earlier article) are likely to be of central
importance; depending on the structures and strategies of the MNEs, the same financial pressures may however trigger very different patterns of structural impacts.

(3) finally the sub-national impact zones are likely to be the ones most significantly hit by the echo effects of financial shocks for they are at the same time the most vulnerable and the best-equipped to take advantage of new opportunities in the new distributed economy.

These conjectures have been formulated in a tentative way to suggest that there may be special loci of impact on each of the three axes of the transformation block. The prospective centrality of networks, OTL and sub-national impact zones in the finance-technology-trade nexus cannot be developed further here. It may indeed be that as the emergent properties of the new financial process become clearer, some of our conjectures will prove wrong-headed. Our intent was only, at this stage, to illustrate the usefulness of the transformation block as a sorting device and to articulate a plea for the sort of broad problematique that underpins it.

**Contextualizing Plausible Worlds**

The usefulness of the analytical framework which we have constructed can also be gauged by its capacity to deal with three series of questions: can it help critically evaluate some ideas currently in good currency? can it throw light on some puzzling stylized facts? and can it help sort out recent controversies? While this may not be a satisfactory test for a theory, this is a robust test for an analytical framework.
Ideas in Good Currency Challenged

As Will Rogers used to say, "the trouble is not what people don’t know; it is what they do know that isn’t so". It would appear that the world of finance is plagued with much such questionable knowledge. Among the many facile generalizations which have become accepted as truisms, we have chosen two which we feel may be fruitfully challenged:

* the view that the world financial system is quasi-perfectly integrated, and
* the view that financial markets provide an accurate image of the real economy.

(1) The "impression" that global financial integration is a fact of life has permeated the popular literature. The 'global 24-hour-per-day trading' stories have fed the myth that the financial world had reached the state of quasi-perfect integration. In fact the extraordinary amount of evidence to the contrary makes it difficult to understand why this false impression has persisted. Sassen has shown that, at the world level, the global financial places are not fully integrated. The multiple layers of financial places, which we have identified earlier, are balkanizing the financial world.

Even at the core of the Anglo-American economic space which is known to give priority to intermediation through financial markets (for example, Canada and the United States), the market segmentation factor is strong enough to allow most analysts to reject the integration hypothesis. One has no difficulty in imagining the sort of results that would be obtained in the analysis of countries that are fully integrated economically than are Canada and the United States.
Consequently, if the financial markets are segmented, they do not perform their *discovery function* or their *provision of enabling resources* functions in a perfect way. The same can be said of banks whose structures, strategies and idiosyncratic focalizations constitute forms of friction and inertia that prevent the best discovery/enabling performance. Consequently, the highest and best rate of innovation will not materialize, and therefore one may expect a lower rate of capital accumulation and a lower rate of wealth-creation than would be otherwise possible. This, in turn, calls for interventions at different levels to reduce the degree of imperfection of financial markets or to effect some institution-building to supplement the financial institutions more effectively.\(^{71}\)

(2) There is also a strong impression that financial markets are 'seismographs' that, with great sensitivity and effectiveness, track the fundamental values in the "real" economy. This is not the case. Even though the available tests for such a proposition are difficult to carry out and are often indecisive, there is enough anecdotal evidence of system over-reaction and financial market volatility to suggest that the hypothesis is wrong. Analytical and empirical studies have provided sufficient evidence that there is no real correlation between stock market values and fundamental values.\(^{72}\)

The reasons for these imperfections stem from the complexity of the foreign investment process, from the extremely balkanized state of financial markets, and from the 'stickiness' in the channels through which capital flows among countries. This in turn reinforces the view that financial markets have a life and a momentum of their own. To the extent however that new financial instruments have been developed to help real-economy actors hedge against such over-reactions, the real economy may be said to have been insulated somewhat from these shocks. But it would be ludicrous to ignore the fact
that the pyramid-like instruments used by the ill-named "hedge funds", for instance, may destabilize financial markets to such an extent that the real economy can be permanently damaged.\textsuperscript{73}

Stylized Facts Explained

The innovation and investment process does not appear to be as well understood as it should. For purposes of illustration, we underline two stylized facts that remain ill-explained:

* the lack of financial resources to fuel the innovation system, and
* the differences in the way that multinationals organize the governance of their operations abroad.

(1) If capital markets were, in fact, as fully integrated as is widely presumed, one would find it difficult to explain why there appears to be so much difficulty for innovators to get access to the capital needed to carry out their plans. In fact, risk capital as patient capital always seems to be in short supply. But if financial markets are poorly integrated, this lack of access to capital is a natural outcome. The requisite linkages between innovation and finance are simply defective and the intermediation challenges that innovators present are simply not being met.

Venture capitalists are a new sort of creature who have the kind of knowledge base and skills that are necessary for identifying, evaluating and 'piloting' firms working with the newest technology. This underlines the prominent discovery/monitoring role of finance.\textsuperscript{74} Venture capitalists play the role of "banks" for small firms as a result of the failure of both financial markets and ordinary banks in
supplying finance to high-risk innovators. This in turn reveals a certain incompleteness in the range of institutions. In the early phases, markets are not working very well; hierarchies with deep pockets serve large-scale innovations in the latter phase of technology life cycles. This explains the large number of acquisitions, mergers and take-overs when the firms reach that phase. But, in the post-start up phase, networks of friends, family and mortgages on the home is a oft'seen financial route.

The availability of specialized venture capitalists as potential partners within financial networks that are equipped with knowledge, trust and who are willing to serve as intermediaries between traditional finance institutions and the innovators was of central importance in the success of Silicon Valley and Route 128 around Boston. The case literature is replete with mishaps that are due to the lack of such intermediaries, despite the involvement of government-secured contracts. This phenomenon is much less general in regimes where banks are the main intermediation process. Small and medium size firms can, in such circumstances, gain access to capital that would normally be denied them if only the capital markets were available. One can therefore ascribe a significant portion of the "lack of capital syndrome" in the Anglo-American economic space to the nature of the financial system.

(2) The wildly different strategies adopted by American multinationals and Swedish or Japanese MNEs in shaping their governance systems abroad is also a source of puzzlement. But it is not without some connection with the different financial systems.

In the USA, financial market myopia dictates short-term maximization that commands centralized control. As Litvak has shown, American multinationals have taken advantage of the new trade
agreement in North America to reposition their subsidiaries: that is, to re-centralize the decision-making process and to reduce the margin of maneuverability of their subsidiaries.\textsuperscript{77}

When one examines the case of Sweden where, as is typical in continental Europe, the financial system is much more a bank-based financial regime, the strategies of Sweden-controlled multinationals reveal much longer term horizons and more decentralization. Indeed the network approach\textsuperscript{78} which bets on a loosely integrated set of regionally-based networks with much independence granted to regional core subsidiaries is a quite different multinational strategy that is very much ascribable to the existence of more patient capital provided by bank partners who are in alliance with the firm for the long haul.

Japan's financial system falls partway between the other two but has experienced a relative decline in the role of banks in the intermediation process in recent decades. Yet despite this 'liberalization wave', many of the traditional traits of the Japanese financial system have remained in place: ensuring low and stable interest rates and bolstering Japan's strategy of building specific industries capable of penetrating the markets of the richest countries\textsuperscript{79}.

Of course, we do not suggest that the whole governance and strategy mix of multinationals is determined solely by the structure of the financial system. Cultural, historical and political factors explain much of the differential, but the dynamic interaction between the financial and the real side of the economy is a key component of the total explanation in most of the case studies. In Japan, the symbiosis between the financial and the real systems has even triggered a reversal of traditional roles
during the crisis of the early 1990s. Industry has bought banks' debt issues, and has thereby assumed the risks usually assumed by financial institutions in a period of crisis when the banks had become a source of potential instability. This reversal of roles is only possible in the presence of major commitments between actors in the two sectors and may only emanate when the time horizon on both sides is rather long. ³⁸⁰

Controversies Put in Perspective

In scientific debates, controversies play a most important role. ³⁸¹ They focus attention on certain features of the process of problem definition; they also sharpen considerably our understanding of certain contentious explanatory mechanisms and permit at least some reasonable alternative explanation to be invoked. Most of the time, controversies trigger a dual evolutionary process: first, a certain degree of focalization on specific aspects of the issue being debated that may hold the key to one or the other party being right; second, a questioning of the basic assumptions, and a prospection of the terrain des opérations, with a view to discovering some other ground that might reconcile those apparently conflicting points of view.

Two controversies will serve as illustration:

* the debate between Michael Porter and Franklin Allen about the impact of the differential financial systems on the capital accumulation process of the USA and of its main competitors in Europe and Asia, and
the debate between Robert Reich and Laura Tyson about the extent to which multinationals are susceptible to national bias in their activities.

(1) Franklin Allen\textsuperscript{82} has argued that while "banks are suited to traditional industries... stock markets are suited to dynamic industries... (because of the) openness of stock markets relative to banks... the greater the number of people that undertake research and consider the problem of the best way to run a firm the more reliable and better the consensus is" (p.16-17). Supposedly, "given stock prices reflect long-term firm value, it is possible to motivate managers to act for the long term, even though they are not alive in the long-term, by making compensation conditional on share price through stock options".

This is not Michael Porter's view\textsuperscript{83}. Porter argues that transient ownership encourages firms to focus on short-term results to the detriment of long-term investments. This would explain, according to him, the dismal performance of the US capital accumulation process in the last fifteen years.

This controversy has focused the attention of the economically sensitive public on the central importance of the intermediation filter for the performance of the real economies. While Allen's argument holds water in principle, it is difficult to support his contention when examining real concrete economies. The evolution of stock markets and the growing importance of institutional investors (who are much more interested in short-term yield than in long-term growth prospects) and the general myopia of the financial markets appears to be dominant feature.
This may explain the development of "corporate banks" (and other such intermediaries) and the drive to press for "universal banking" even in countries where financial markets are extremely well developed. Such institutions might be able to insulate enterprises somewhat from the vagaries of the financial markets and to provide an intermediate mixed form of organization capable of developing a higher quality discovering and monitoring function and the requisite commitment for real partnerships to develop.

(2) There has been also some controversy about the importance of the "nationality" or general ownership characteristics on the conduct of firms. This controversy is summarized aptly in two synthetic papers by Robert Reich and Laura Tyson. 

Reich claims that globalization has de-territorialized multinationals and that, in this global market, locational advantages and profit opportunities are the only meaningful compasses. For Reich, in the planning world of multinationals, "no group of citizens or government has a special claim". Tyson disagrees and presents ample evidence about the imperfections and frictions in both the world economy and the financial process. She argues for a position of "cautious activism" because of these imperfections and biases. She argues this case with particular vigour viz. high-technology industries where synergies and dynamic efficiencies loom large.

These two positions are not as sharply contradictory as they would first appear. It may well be, as Tyson herself argues, that, in many sectors, comparative advantage and competition factors à la Reich are the ones dominating not only the location strategy but also the contours of sourcing and
the strategy of the firm. But when either global concentration is high or government intervention is important, or both, all sorts of features within the environment are transformed. David Yoffie has suggested that the drivers of international trade may become quite different from comparative advantage. He has mapped out the other three possible regimes: when global concentration is high and government intervention is low (oligopolistic competition), when both are high (political competition), and when global concentration is low and government intervention high (regulated competition).  

These regimes generate much inertia, quite a bit of stickiness, and much scope for strategic intervention. It is therefore important to specify more closely those characteristics of the environment before taking sides in the Reich vs Tyson debate. If global concentration of industry is low and government intervention is also low, it may be that Reich's position holds. But in the other three regimes, it would be silly to ignore the synergies and privileged relationships as an important lever in firms' and governments' strategies. Multinationals most certainly will not hesitate to use them for their private benefits.

The issue is to determine if strategic trade policy interventions on the part of governments might also be desirable from the point of view of nationals. It is not a matter of insisting on rigid maximization of narrow "national interests" or on strictly enforced "nationalistic" linkages but rather a matter of exploring the possibility of taking full advantage of lower costs of transactions and of economizing on the factors ensuring quality, security of supply, etc. by injecting some elements of trust in the decision-making.
Consequently, one cannot simply decide, *ex cathedra*, for either party in this Reich-Tyson controversy. One must rather examine the circumstances of each industry in order to establish whether the industrial organization and the relative importance of government provide both opportunities for non-market forces to play a significant role and whether it is possible and profitable for government to choose to intervene. Such decision, in any case, cannot be taken once and for all. Indeed, one of the main lessons of results of Yoffie's work is that the environment evolves importantly, and it evolves in a dis-continuous, often unpredictable, way in the information age. This entails that emerging properties of the environment are the new challenges and that firms and governments must accordingly be ready to modify continuously their strategies in a world where the ground is in motion.

* * *

One of the main reasons why there is so much confusion and differences of opinion at the interface of the 'real' economy and of the world of finance is that both worlds are now in a process of transformation and that consequently the interface is going through a significant reconfiguration. The new dynamics of the technology-trade nexus are built on the interaction between locations, organization and technology (OTL) decisions in the context of development blocks. Complementarities, interdependencies and externalities play a fundamental role in this new dynamics and networks become the new integrating organizing principle: firms and governments quasi-disintegrating themselves into semiautonomous units and actively re-integrating their functions through alliances and partnerships. In the 'real' economy, the information age has triggered the
dispersive revolution, and the dispersive revolution has brought forth the age of the network.\textsuperscript{88} The financial system is going through an equally significant mutation. The new international financial system has generated much volatility of interest and exchange rates, but also of capital movements. Neither the multinationals (of which banks are a sub-set) nor the financial markets have succeeded in fully meeting the needs of the 'new economy' as fully as might have been desired. The financial innovations of the last decades have therefore invented new ways to provide financial services and the new financial institutions and new instruments designed to share risks and provide insurance for major players have often developed a third way between multinationals and financial markets, in a manner not dissimilar to the way the network has provided a third way between the market and hierarchy organizational forms.

"Securitization, or the raising of capital sums without the intermediation of banks (for loans) or the stock markets (for shares and rights issues) is one aspect of this new financial system". Securitization in nothing but the last stage in the process of globalization and de-regulation of the financial services industry trying "to escape the constraints imposed by physical space and tangible resources"\textsuperscript{89}

What one is confronted with in this information age is a finance/'real' economy interface where institutions and organizations have become more spectral, where the governance systems have become more distributed, where fuzziness has increased and where emergent phenomena are omnipresent. It is hardly surprising that discourses about the transformation of the institutional order appear to be so vague and non-committal.\textsuperscript{90}
Conclusion

In a paper published earlier in this Journal\textsuperscript{[1]}, we put forward a number of modest general propositions. One may sketchily enumerate a few of the central ones:

(1) in the new knowledge-based world economy, the trade patterns are dependent on technology;

(2) firms operate in a world of intercreation among technology, organization and location, and these are jointly chosen;

(3) such choices are shaped by systemic forces (technological, social, economic) that may either facilitate or hinder the choice process and therefore the innovation process;

(4) this was defined as presenting six major challenges to public policy makers:

* how to intervene in such a way as to take the fullest advantage of the new information and knowledge-intensive economy
* so rich in complementarities and untraded interdependencies,
* with a full appreciation of the fact that investment drives trade
* and that trade is more and more intraorganizational,
* while keeping in mind the new challenges posed by the virtual nature of firms and governments
* and the new importance of sub-national dimensions of national economies;

(5) it was felt that in this context both naive liberalization or head-to-head warring blocs were unlikely to generate much good: negotiated access was the preferred strategy;

(6) in designing a strategy of negotiated access, it was felt that one had to start with a meso-level or middle-range approach based on production/innovation dynamics in which government-business relations would play a central role.

These propositions still stand. However, it has become clear that, when financial dimensions are added, complexity increases. On each of the six fronts mentioned in the last paragraph, a more complex formulation is called for:
(1) trade patterns will be shaped by technology and investment, but these in turn depend heavily on the financial system;

(2) the financial system also acts as a main force in the firm's choice within the organization-technology-location synergy space: finance can play a role to speed or hinder the choice process and thereby affect dramatically the process of technological change;

(3) one must therefore take fully into account the features of the financial system in gauging the possibilities of economic progress for the economy;

(4) the way in which finance intermingles with all the other relevant variables is making the challenges facing policymakers yet more difficult: the transformation bloc has been used to stylize the complex interface between the financial and real economic systems and it has been shown that the nature of the financial system and the particular constraints it imposes on the transformation bloc have significant impacts on the process of wealth-creation in the real economy; in particular, the balkanization of the financial system, and the growing role of networks in it, would appear to promise a stronger structural impact and a more important valence for the sub-national impact zones in the future for such networks are more likely to emerge at that level;

(5) the negotiated access strategy has been re-inforced by the introduction of financial variables for it has become clear that reliance on markets or brute force would be yet more damaging in this more complex world;

(6) finally, this has added a most important new component to the strategy design that policymakers must envisage: in addition to the production/innovation dynamics and to the government-business dynamics, our meso level analysis must also encompass the finance/real economy dynamics as one of its core elements.

Has this new dimension helped us to somewhat sharpen our meso-level analysis? We would claim that it has in a variety of ways.

First, we have been led to ascribe some of the responsibility for more successful or less successful innovation systems to the financial system. Consequently, we have attenuated considerably the maybe-too-strict a focus on technology per se that had permeated our earlier paper. Second, we have
been led by the multi-layered structure of the financial system and by the growing importance of sub-
national financial spaces to re-examine the notion of national system of innovation and to relativize
substantially its relevance. In that sense, finance has helped to put into focus the new importance of
meso-innovation systems. Thirdly, we have been led to downplay also to a considerable extent the
deterministic nature of the trade/technology nexus: investment and finance drive a major wedge into
this nexus, and it may well be that most of the trade patterns are less a direct result of technology than
an indirect and importantly mediated result of technology as catalyzed by the investment/finance
process. Fourthly, we have been forced to step back from both technology and investment/finance
as absolute prime movers in this trade/technology/finance nexus. In fact, in true Schumpeterian spirit,
one may have to fall back on the centrality of innovation and entrepreneurship. "New structures
appear when a basic idea, pattern or form has been developed which provides a "catalytic agent" or
organizing factor through which other components and structures are produced". A return to the
founding concept of entrepreneurship reveals both technology, investment, trade and finance to be
intermediary effects rather than basic causes. This in turn enables one to re-focus policy makers'
attention on promoting innovation and increased levels of entrepreneurship and on eliminating factors
that might inhibit such changes.

This paper does not yet take us the full distance to a completely satisfactory analytical framework that
would guide work in the finance-technology-trade nexus. It has however enriched considerably our
previous perspective. The next step must be a dynamic reformulation of this framework along the lines
suggested by Jenner. This in turn forces one to face head on the most challenging of all the black
boxes - entrepreneurship - instead of being satisfied with nibbling at it through indirect indicators.
Notes

1. John de la Mothe and Gilles Paquet are Directors of the Program of Research in International Management and Economy (PRIME) at the Faculty of Administration, University of Ottawa. This research was supported by SSHRC grants 410-93-0471, 809-94-0002 and 809-97-0005. The valuable assistance of Monica Gattinger and Marie Saumure, and the comments of Jeffrey Roy are gratefully acknowledged.


8. The question of institutional carrying capacity is raised by Sylvia Ostry, "Globalization and the Nation State", in John de la Mothe and Gilles Paquet (eds.), Challenges Un-Met in the New Production of Knowledge (Ottawa, PRIME, 1997), pp. 63-76.


23. This is explained extremely well in M. Hepworth, Geography of the Information Economy (London: The Guilford Press, 1990).


27. For instance, it is clear that "burdensome legislation for foreign banks is delaying their entry into the United States" M. Gruson, "Are Foreign Banks Still Welcome in the United States?" The Bankers
28. S. Sassen, op.cit. has suggested a general hypothesis about the complementarity of the three major financial places that have established some hegemony within certain time zones: Tokyo as the centre of export capital, New York as the main receiver of capital and London as the center for processing capital. See also J. Peet, "Financial Centers: Rise and Fall" The Economist (June 27, 1992).

29. A main type of such financial places is the offshore financial centre offering a haven to corporate clients, but the continental/regional/specialized centers are mainly serving a region (like Taiwan and Singapore) or are trying (like Frankfurt and Paris) to develop a spatial empire of sort. For a good overview of these activities, see the numerous reports in Euromoney [May 1992 (Taiwan), January 1993 (Singapore), August 1993 (Frankfurt)].

30. Paris and Frankfurt are such places. So are Shanghai and Shenzhen aiming at building a strong national base with the intention of leveraging it later into an international position of power. Other places like Lyon would appear to be ready to ease themselves into the role of national center as soon as Paris gets lured into a continental role.

31. For a look at an interesting case of thriving regional exchange, see H. Roy, "Lyon at the Crossroads" Euromoney (July 1990) (in its special supplement on France).

32. A multistable system is one in which a greater resilience and ability to adapt successfully is ensured through discontinuities among the sub-systems. W.R. Ashby, Design for a Brain (London: Chapman & Hall, 1952).


35. A. Gerschenkron, Economic Backwardness in Historical Perspective (Cambridge, Mass.: Harvard University Press, 1962); R. Cameron, op.cit..


38. There is much anecdotal evidence to this effect, but also some sound questioning by academics. L.H. Summers, "Does the Stock Market Rationally Reflect Fundamental Values?" The Journal of


41. L.H. Summers, op.cit.


51. R.J. Singh, op.cit. suggests that banks can do the job better than financial markets.


64. K.S. Wever & C.S. Allen, op.cit.


67. Perusing Maurice Estabrooks' *Programmed Capitalism* which draws heavily from the financial and popular press to develop his sketch of what was going on in the late 1980s in the financial world, one may document easily the extent to which the quasi-perfect global financial integration hypothesis is regarded as a truism.


71. Felix Rohatyn has suggested "a GATT for investment just as there was a GATT for trade" F. Rohatyn, op.cit.; at the national level, there has been much discussion in Canada of a move toward "universal banking", i.e., a certain broadening of the range of activities of banks. While this is only a very timid move in the direction of banking as it is experienced in Germany and Japan, it indicates an interest in refurbishing the banking institutions to make them more effective (C. Freedman, "Universal Banking: The Canadian View" in D. Vittas (ed.) *Financial Regulations: Changing the Rules of the Game* (Washington: World Bank, 1992) pp. 369-390.

72. L.H. Summers, op.cit.

73. See F. Rohatyn, op.cit.; also D. Shirreff, "Can Anybody Tame the Currency Market?" *Euromoney* (September 1993), pp.60-69.


75. F. Prakke, op.cit.

76. R.J. Singh, op.cit.

77. I.A. Litvak, op.cit.

78. P. Ghauri, op.cit.


80. C. Somel, op.cit.


82. F. Allen, op.cit. pp. 16-18.


91. J. de la Mothe & G. Paquet, op.cit.
