4

Finance, Intangibles and the Privatization of Knowledge

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4.1 Introduction

Financialization of the economy and privatization of intangibles have reinforced each other. In many ways, they make two sides of the same coin. Consider, for instance, knowledge. Knowledge is an intangible, and as with many intangibles it can be used without consuming or even touching it. As most intangibles, knowledge is a non-rival good: using more of it in one application does not reduce its availability for another application. If knowledge is publically available, it cannot be the object of financial claims: everyone can use it and no one can claim an income from the fact that others use it, or a monopoly rent from the fact (s)he is the only agent who is allowed to use it. Similarly, if knowledge is in the mind of an individual, in non-slave societies financial claims on knowledge are impossible, because they would imply the ownership of person. Also, a trade secret cannot be the object of financial claims because, to understand its worth, the knowledge should be disclosed, which would destroy its value as a trade secret. Also, for this reason, the value of a trade secret is so uncertain that it is impossible to hold any financial claim on it.

Unsurprisingly, until recently, intangibles like knowledge could not be a relevant part of the capital of a firm. They lacked the attributes of priority, universality and durability. Only these attributes can allow financial claims on a machine or a building and give them the qualification of capital.[1] For instance, the holder of a trade secret cannot claim any priority against the holder of identical trade secrets. Moreover, her claims would not be universal but would be limited to the persons who had had

* I am very grateful to David Donald for all his useful comments and suggestions. David is not responsible for my mistakes but he has greatly helped me to avoid some mistakes and to improve many parts of this chapter.

[1] This important point has been made by K. Pistor, *The Code of Capital* (Princeton NJ: Princeton University Press, 2018, forthcoming).

some working relations with her. And finally, the durability of the privilege could end at any moment when other independent discoverers of the substance of the secret disclose it. Knowledge in the form of a trade secret – and even more if held by humans or in the public domain – could not be part of the capital of a firm.

The situation has substantially changed with the introduction and the massive diffusion of intellectual property rights (IPRs). IPRs give a priority to their holders also against individual who make an independent discovery, have a duration longer than most machines and, thanks to recent international treaties, have almost universal application.

Intangibles, such as privatized knowledge, have therefore become part of firms' capital and have greatly increased the assets on which it is possible to have financial claims. However, the increasing share of intangible assets has not only meant a dramatic expansion of finance but also an impressive change of its characteristics. Most intangible assets, including IPR, are highly specific and often even unique assets, which cannot have thick markets like buildings and machines. For this reason they cannot be a good source of collateral for traditional types of banking, so that their expansion has been an important cause of a shift towards other forms of finance.

Section 4.2 of this chapter compares different types of financing in a framework of incomplete law, which does not require that the rights and the duties of the individuals are completely specified. The focus is on two very stylized typologies of finance: loans secured by collateral (banking) and equity funding of firms run by professional managers (equity), which turn out to have a different distribution of ex-ante and ex-post rights.

Section 4.3 considers the relationship between finance and specificity. It is shown to be a complex one, where financial structure influences the degree of specificity of the assets, and the degree of specificity of the assets influences the financial structure of firms. We may have multiple equilibria, and the selection of a particular equilibrium can depend on a different mix or a new regulation of financial activities, or it may be due to the fact that the degree of specificity of the underlying assets has changed.

Section 4.4 argues that, while the changes of financial claims have received much attention, some relevant structural changes may be rather due to the nature of the underlying assets. In particular, the spectacular increase of intangibles is likely to have increased the role of equity and

other firm-basis forms of finance relative to traditional forms of banking, guaranteed by assets with thick markets and intelligible market values.

The concluding section argues that excessive financialization mirrors the abnormal growth of intangibles and, in particular, of the assets related to the privatization of knowledge. For this reason, international regulations should also tackle the negative effects of over-enclosing the knowledge commons.

4.2 Incomplete Law and the Nature of Financial Transactions

According to Fuller, law is the activity of subjecting human behavior to rules. Since humans are also engaged in other activities (such as producing food), there are trade-offs between law and other activities.[2] These trade-offs make law incomplete. Completing the law is sometimes not feasible, and is often a costly enterprise. Only within certain limits is it worthwhile to complete the law. Moreover, some other trade-offs are internal to law. For instance, if rules have to guide human behavior, they cannot change too often. At the same time they have to adapt to a changing reality. There is a trade-off between flexibility and rigidity of rules.

Another important trade-off considered by Fuller is that between the comprehensibility and the technical precision of a rule. Even more important are the trade-offs between the specificity (deepness) and generality (wideness) of rules considered by Pistor and Xu,[3] which we represent in Table 4.1 and Figure 4.1. Ex-ante specific rules prescribing in detail what to do in particular situations favor effective enforcement in particular cases, but they fail to cover a large number of cases. Here, incompleteness may be due to an insufficient generality of the rule involving *wideness incompleteness*. Ex-ante general rules that cover a large range of possible situations suffer from the opposite problem. Incompleteness may stem from their lack of precision and their superficial nature may involve a form of *deepness incompleteness*.

[2] This trade-off emerges in what Fuller defines as the morality of aspiration that is the human effort to make the best of their lives. However, Fuller's view is much broader and also includes what he calls the morality of duties, which has important consequences, including singling out the characteristics that a legal system should satisfy. L. Fuller, *The Morality of Law* (New Haven CT: Yale University Press, 1969).

[3] K. Pistor and C. Xu, "Incomplete Law," *International Law and Politics*, 35 (2003), 931–1013.

Table 4.1 *Forms of Legal Incompleteness*

	Detailed ex-post Enforcement	Wide ex-post Enforcement	Form of Incompleteness
Ex-ante specific rule	Yes	No	Wideness Incompleteness
Ex- ante general rule	No	Yes	Deepness Incompleteness

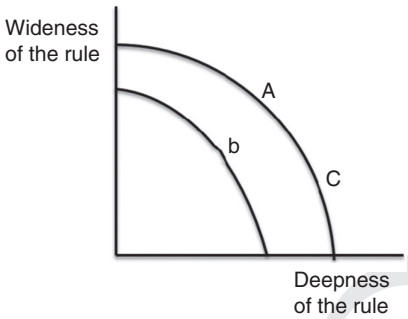

Figure 4.1 The Legal Incompleteness Trade-off

Hence we must face a legal trade-off between w*ideness incompleteness* and *deepness incompleteness*. In some cases, rules can be revised without sacrificing one objective for the other. If we can move from P[illegible]oint A of Figure 4.1 we can improve both the wideness and the deepness of legal rules. By contrast, moving from A to C involves improved deepness at the expenses of reduced wideness of the rules. When wideness and deepness of rules can both be improved with no reduction of the other, no choice between them is required but, when we reach a point where a trade-off exists, we must balance the costs of one form of legal incompleteness against the other and face the problem finding the less damaging forms of legal incompleteness.

Observe that in Kelsen's mainstream legal approach, law is treated as a consistent set of rules and no incompleteness is admitted in the rule of law. In terms of the Hohfeldian tradition,[4] this involves a consistency among the legal positions of all the persons acting in the same legal

[4] W. N. Hohfeld, "Fundamental Legal Conceptions as Applied in Judicial Reasoning," *Yale Law Jounal*, 26 (1917), 710.

system. In the framework of complete law, rules would specify both the extension of the rights of a certain individual (i.e. their boundary with the exposures of this individual) and the corresponding extension of the duties of other individuals (i.e. their boundaries with their liberties).

By contrast, in a situation of incomplete law only the rights, or only the duties (or none of them!), would be completely defined ex-ante. Some ex-post adjustment is necessary. When some legal positions can be better defined than the others, an obvious strategy, and sometimes even a necessity, of law-making is to define the positions that can be defined ex-ante, leaving to ex-post decisions the definition of the other positions on the basis of additional future information. In this respect, we can define different legal arrangements arising from some stylized forms of legal uncertainty.

Complete law with fully defined rights and duties is feasible when it is possible to define both with certainty the rights and the corresponding duties (case 1 of Table 4.2). We have two intermediate situations. In one situation, it is possible to spell out precisely some rights but not the corresponding duties (case 2). In the other situation, it is possible to spell out the duties but not the corresponding rights (case 3). Because of the first type of legal uncertainty we may therefore have situations when ex-ante rights or duties are defined and some ex-post governance of duties or rights is necessary. In this case, while the governance cannot be entirely ruled by the initial agreements, it is however guided by the legal positions that it was possible to define ex-ante. Some legal interpretation and disagreement on the ex-post nature of the rights (duties) matching the ex-ante duties (rights) is likely to arise and the initial constraints may in some cases include a certain number of possible outcomes. Such guidance is obviously absent in case for case 4 where legal uncertainty involves both rights and duties and ex-post definition of rights and duties cannot be guided by some initial definitions of some legal positions.

Table 4.2 *Legal Positions and Uncertainty*

	Certain Duties	Uncertain Duties
Certain Rights	(1) Ex-ante defined rights; Ex-ante defined duties	(2) Ex-ante defined rights; Ex-post defined duties
Uncertain Rights	(3) Ex-ante defined duties; Ex-post defined rights	(4) Ex-post defined rights; Ex-post defined duties

The possibility of defining ex-ante rights and/or duties characterizes different systems of legal orderings considered in Table 4.3. The ex-ante definition of rights and duties allows a complete legislation under which it is possible to write complete contracts. In case (1) contract law can here be a pervasive system of legal ordering and the theoretical construction of an economy with complete contracts can even sound as a reasonable description of an economic system.

When the rights can be clearly defined ex-ante but the corresponding duties are uncertain, the initial contracts fail to offer a satisfactory legal ordering and contract law needs to be integrated with liability law and bankruptcy law. This is case (2). Much constitutional law and international law also offer a clear definition of rights leaving to policy-makers the task of making the necessary ex-post adjustments of duties. Judicial proceedings are required to define the ex-post duties that are consistent with the ex-ante rights. This is the case of accidents, analyzed by Guido Calabresi, and it is also the case of individuals unable to fulfill the duties that were agreed under the initial contract.

By contrast, negligence law, criminal law, duties of care and regulations fall under case (3), where duties are precisely defined ex-ante and rights adjusted to the existing duties only ex-post. Since the goal of the system is still the satisfaction of the rights, regulatory activity has to verify continuously how in practice the ex-ante duties satisfy the targeted ex-post rights. For this reason, regulatory activity bundles together rule-making and enforcement powers.

Case (4) is a case in which both ex-ante duties and ex-ante rights cannot be defined. In this case pervasive ex-ante legal uncertainty means

Table 4.3 *Legal Outcomes in a World of Uncertainty*

	Ex-ante Defined Duties (Liberties)	Ex-post Defined Duties (Liberties)
Ex-ante Defined Rights	(1) Complete legislation; complete contracts	(2) Liability law and judicial decision; social and welfare policy; bankruptcy law
Ex-post Defined Rights	(3) Regulation, rules of negligence, rules on duties of care	(4) New law-making power; corporate and public executive powers

that there is wide discretionary power in the ex-post rules. In this case the only thing that can be done ex-ante is to agree on a legitimate authority (private or public), which has the power to establish and balance the ex-post rights and duties.

It is very difficult to find real-life governance systems that fall under one of these pure four cases. However, we can see how traditional banking activity and equity finance are both characterized by legal uncertainty and differ in the type of legal positions that can be defined ex-ante.

Traditional banking falls mainly under (2). Creditors have well-defined ex-ante rights to which the ex-post duties of the borrowers are adjusted. In some particular cases, such as default, some ex-post governance of the relation is necessary. Bankruptcy rules differ in different countries and involve some redefinitions of the duties of the borrowers to which the ex-ante rights of the creditors have to be readjusted.[5]

Shareholding finance falls mainly under (3). Corporate managers have well defined ex-ante duties, which involve ex-post rights (dividends and values of the shares) of shareholders. Their duty of care involves a certain vagueness of the ex-post actions that best fits the rights. Because of the discretionary power of managers, shareholders have to monitor that managers are fulfilling their ex-post duties.

In a regime of incomplete law, equity and debt finance turn out to be also different for different types of the underlying investments that we will consider in the following section.

4.3 Finance and Specificity

The Modigliani-Miller equivalence of equity and debt financing relies on the idea that it is the same to contract a loan and buy a firm or to buy directly a firm that has contracted a loan at the same conditions.[6] Their argument ignores the fact that agents with different reputations and assets available as collateral face different costs when they borrow. Moreover, it ignores bankruptcy costs.

However, this chapter will argue that the main problem with the Modigliani-Miller theorem is that it ignores the relationship between

[5] For instance, in the United States an insolvent debtor can file under Chapter 11 of the Bankruptcy Code to obtain some rearrangement of the ex-ante rights of the creditors. Other legislations do not allow a similar rearrangement.

[6] See F. Modigliani and M. Miller, "The Cost of Capital and Theory of Investment," *The American Economic Review*, 48 (1958), 261–297 and in particular pp. 268–269 where they formulate their famous theorem.

technological choice and governance structure. The technical assets that are best under one governance system are not necessarily the best assets under a different system. If we are in a world without bankruptcy, where managers' duties can be completely specified, then the two systems turn out to be equivalent. However, in a world with legal uncertainty the two systems operate best with different technical assets and tend, in turn, to bias the choice of technical assets. In particular the two systems tend to favor the use of assets characterized by different degrees of specificity.[7]

The degree of specificity of an asset is the share of its value that is lost when it is moved from one use to another best employments. Thus, the specificity of an asset is not an intrinsic characteristic of the asset. Its degree of specificity may increase because some alternative employments have vanished or may increase because new opportunities have opened. We will see in section 4.4 how institutional changes have increased the specificity of assets in the modern economy. In this section we focus on the relation between different forms of finance and different degrees of asset-specificity.

Under traditional banking, creditors have well defined ex-ante rights to which the ex-post duties of the borrowers are adjusted. Their rights have priority over shareholders in case of bankruptcy. Their interests are best protected if the borrower engages in projects that involve the development of low specificity assets that can be easily redeployed in case of bankruptcy. By contrast they are not interested in high returns of risky projects involving high asset specificity.

Under equity financing, shareholders have ex-post rights (e.g. to receive dividends) corresponding to managers' ex-ante duties to the corporation. Shareholders are the last ones to be compensated in the case of bankruptcy, and gain little from low-specificity assets in the event of liquidation. By contrast they share the gains of risky projects characterized by high asset specificity.[8]

[7] The degree of specificity is the share of its value or productivity of the resource, lost when the resource is moved to its next best use. Williamson attracted the attention of economists on the importance of specificity to understand the nature of the different governance systems. O. E. Williamson, *The Economic Institutions of Capitalism* (New York: The Free Press, 1985).

[8] This chapter treats here debt and equity as two forms of financing and assumes that each group of financiers when prevalent can exercise some pressure on the management of the organization. The important issue concerning the shareholders as "owners" of the corporation is not considered. The view that the shareholders are the owners of the corporation is increasingly challenged by the recent legislation. In this chapter, equity appears only as a form of finance, and not as a form of ownership of the corporation.

Higher degrees of asset specificity increase the value of the company for shareholders and decrease its value for creditors. One may argue that for each degree of asset specificity there is an optimal debt-equity mix maximizing the value of the company.

Debt is a cheap system of governance where the financier needs only to monitor the liquidity (non-specificity) of its assets. However when the sacrifice of valuable high-specificity projects exceeds a certain threshold, some equity finance increases the value of the company.

An optimal debt-equity ratio should correspond to each degree of asset-specificity. Low levels of specificity favor low equity/debt ratios, and high levels of specificity favor high equity/debt ratios[9].

However, specificity characteristics cannot be assumed to be independent of the existing governance mechanism.

If creditors have control over the governance of the firm, they will favor low-specificity investment projects. Their ex-ante rights of recovering their capital are particularly valuable if managers have (over-)strong duties to adopt low-specificity projects. Low-specificity investments are easily recoverable in case of liquidation of the assets of the firm.

By contrast, if shareholders control the governance of the firm they will favor high-specificity investments. Their ex-post rights to earn profits will be translated in over-strong duties of high-specificity projects that increase the value of the shares.

In other words, the rights of creditors and shareholders protect and truncate their earnings in different ways. Creditors have an ex-post priority right to receive back the funds lent, with agreed interest, in case of the debtor's insolvency, but their rights are truncated in receiving the profits of the enterprise. Shareholders have no protection for their capital contributions and no priority (over creditors) in the case of insolvency, but they are not truncated in their right to receive ex-post earnings from projects. Because of their different interests, shareholders and creditors tend to favor different asset structures.[10]

Thus, causation can run in opposite directions. It can run from the financial form of governance to the degree of asset-specificity, or vice versa. Figure 4.2 joins these two directions of causation and suggests how

[9] The account of this direction of causation (from degree of specificity to governance structure) is based on Williamson, *Institutions of Capitalism*.

[10] The account of this direction of causation (from financial structure to degree of specificity) is based on A. Nicita and U. Pagano, "Finance-Technology Complementarities: an Organizational Equilibria Approach," *Structural Change and Economic Dynamics*, 37 (2016), 43–51.

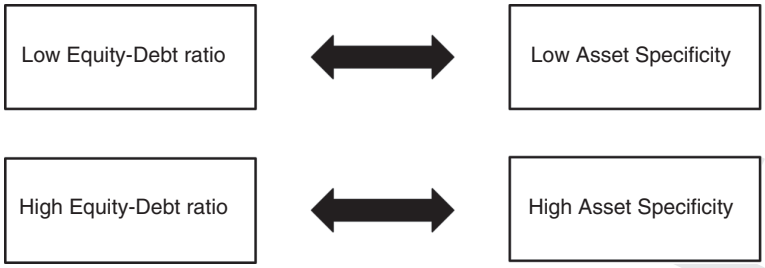

Figure 4.2 Financial Equilibria

they can generate multiple financial equilibria characterized by different finance-technology complementarities.[11] Financial equilibria define self-reinforcing processes. A certain type of assets may reinforce its nature by favoring the corresponding form of financial governance and, vice versa, a certain form of financial governance may reinforce its characteristics by favoring the related types of assets.

Because of the self-reinforcing nature of each system of governance, one may expect a certain polarization of the different organizations.

One may argue that appropriate regulations, such as limits on permissible leverage, may try to avoid extreme polarizations. However, they may also produce useless standardized hybrids, unable to cover the different nature of the assets characterizing the firms to be financed.

Moreover some regulations may have unintended effects. For instance, by making managers duties more responsive to shareholder ex-post rights, regulations may push firms towards an excessively high level of asset-specificity, and damage creditors' interests. Or, in other cases, by making managers more responsive to ex-ante creditors rights to collateral, regulations may push towards excessively low levels of asset-specificity and damage shareholders interests.

Other problems of regulation have to do with the complex nature of asset-specificity. In comparison to traditional societies, modern societies have decreased the degree of specificity of many assets but in many cases, the employment of specific assets is still necessary to increase productivity and for many innovative activities.

However, an increase of the productivity of specific assets does, not seem to be the main cause of the recent increase in their intensity. As we will see

[11] For a formal analysis of financial equilibria and the precise conditions necessary for their multiplicity, see Nicita and Pagano, "Finance-Technology Complementarities."

in section 4.4, this increase has more to do with the increasing monopolization of modern capitalism and the related privatization of the knowledge commons, than with an inevitable tendency of modern technology.

4.4 Intellectual Monopoly and the Enclosures of Knowledge Commons

According to Schumpeter, capitalism is characterized by a process of "industrial mutation". This process "incessantly revolutionizes the economic structure *from within*, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism. It is what capitalism consists of and what every capitalist concern has got to live in."[12]

In spite of Schumpeter's influence on the discipline of economics, his analysis of capitalism may be rather outdated. Schumpeter almost ignored the role of intellectual property (the term "intellectual property" was not even generally used at the time he was writing). He did not perceive the protection that legal intellectual monopoly could offer against his process of creative destruction. His analysis belongs to a period in which the dramatic reinforcement of what came to be known as intellectual property had not yet taken place. Moreover, his emphasis on entrepreneurial innovation ignores the fact that the distribution of the fruits of innovation and of working knowledge has always been a source of fierce conflict also within the capitalist firm.

In a world of complete law and contracts, the problem of the ex-post distribution of the fruits of working knowledge and of other productive factors would not arise. However, in a situation of incomplete law and contracts the division of the production surplus is highly uncertain. Some institutional solutions, which are available for avoiding opportunistic behavior for non-human capital, are not feasible to reward working knowledge and, in general, human effort.

If machines are specific to each other, different owners can decide to own them jointly and have shares in the same entity. In this way, owners may sell their shares, but not the single machine, whose withdrawal from production might have a dreadful effect on the productivity of the other machines. Moreover, if additional machines are required for production, one can borrow money to buy them, using machines as collateral.

[12] J. A. Schumpeter, *Capitalism Socialism and Democracy* (London: Unwin University Books, 1952), 83.

Analogous solutions for the skills and the working knowledge held by workers are much more difficult. One worker cannot own parts of other workers and, in general, individuals cannot own shares of other individuals. Moreover, absent slavery for debt, individuals make an unreliable collateral.

The problem is made even more complex by the non-rival nature of knowledge. The same working knowledge can be used in many other firms even if they contribute very little to its development. Specificity is not an intrinsic characteristic of resources. If new opportunities arise, what is now specific working knowledge may become general-purpose knowledge. Vice-versa, what is general working knowledge may become specific, if existing opportunities close.

Indeed, referring again to the scheme considered in Table 4.3, a new analogous scheme (Table 4.4) may be obtained, showing the different legal systems by which the production of knowledge can be organized.

In a regime of complete law we may define ex-ante the rights on future knowledge and the consequent related (case 1) restrictions on the liberties to use this knowledge. In the case of new knowledge, this solution is particularly difficult. If we have not yet produced the knowledge we are unlikely to be able to specify the future restriction of liberties applicable to given rights of knowledge.

The second approach (case 2) states ex-ante well-defined liberties on the use and the production of knowledge. Some rights on the new knowledge can be attributed ex-post, but only insofar as they do not

Table 4.4 *Knowledge Economy Arrangements*

	Ex-ante defined liberties	Ex-post defined liberties
Ex-ante defined rights	1) Complete contracts on very well defined research projects	3) Intellectual property; closed science; trade secret restrictions
Ex-post defined rights	2) Academic research; rewards and prizes for publications and discoveries; open science; *artisanal independence*	4) Free and creative intellectual exchanges; governance of collective learning

contradict the ex-ante stated liberties to engage in the production of knowledge. Academic research with rewards and prizes for publications and discoveries, open science and the principles of artisanal independence share a clear ex-ante priority of research liberties over the future rights to be rewarded for its outcomes.

The third approach (case 3) specifies ex-ante the rights on knowledge and limits in unpredictable ways the future liberties of the individuals. Intellectual property and closed science developed for profits under a regime of secrecy have these characteristics. Trade secret restrictions and intellectual property rights give employers ex-ante rights on the many fruits of the knowledge acquired by their employees and limits in unpredictable ways the future ex-post liberties of the individuals.

Finally, case 4 is one in which both ex-ante rights and liberties cannot be specified and requires complex forms governance of collective learning under which free and creative intellectual exchanges can take place.

The conflicts related to the appropriation of the working knowledge were treated in different ways by the legal system in different periods. Fisk shows how the capitalist system evolved from regimes of strong workers liberties and weak corporate intellectual property rights to regimes of strong corporate intellectual property rights and of weak workers liberties (or, in terms of Table 4.4, it moved from case 2 to case 3). According to Fisk,[13] three periods marked the transition of American and British common law from the emphasis on workers' liberty to use their knowledge in all employments, to the emphasis on the corporate ownership of intellectual property rights, implying also the enforcement of trade secrets and of restrictive covenants.

As Fisk points out, from 1800 to 1860, courts stated repeatedly that skilled workers had no fiduciary responsibilities.[14] They could not be restricted in their liberties to change employment and use somewhere else the working knowledge acquired in previous employments. Trade secrets were considered to be a limitation of competition and of the fundamental liberties of the workers. Post-employment covenants were usually considered to be illegal, or at least unenforceable.

[13] See L. C. Fisk, "Working Knowledge: Trade Secrets, Restrictive Covenants in Employment, and the Rise of Corporate Intellectual Property 1800-1920," *Hastings Law Journal*, 52 (2001), 441, 449, where she explains how the "article is organized chronolgically".

[14] See ibid, Pt. I.

From 1860 to 1890, courts started to regard trade secrets as a possible obligation of employment, which should however be explicitly included in the initial contract[15].

The period 1860–1920 witnessed the diffusion of a more radical view regarding trade secrets as an implicit condition of employment. The breach of trade secrets started to be seen as a misappropriation of property, automatically forbidden by the employment contract.[16]

> In enforcing contracts first, only if they were express, and later by recognizing such contracts as implied-to maintain secrecy of the employer's methods, courts created a new species of "intellectual" property at the expense of older notions of artisanal independence. This was undoubtedly a case of "creative destruction" of one form of economic privilege to create another – the corporate intellectual property.[17]

Artisanal independence was also limited and often destroyed for the majority of workers by the scientific management movement of Frederick Taylor. According to Taylor, artisanal skills had another major drawback for the employers: the traditional system of management was ill-suited to increasing workers' effort.[18] Traditional management relied on the knowledge of the workers, in the sense that the managers believed that the workers knew better than they did how to perform their jobs. Under traditional management, the workers could work less than "fairly" by claiming that a certain amount of time was required to perform a certain job. The situation of "asymmetric information" existing under traditional management implied that the managers had no means of challenging this claim. Taylor's solution to this problem was straightforward: the managers, and not the workers, should know how the jobs could be best performed, plan how they should be executed, and give the workers detailed instructions about their execution.

It was only by gaining control over the labor process that the managers could reverse the situation of asymmetric information and control the workers. Braverman summarizes the content of Taylorism in three different

[15] See ibid, Pt. II.
[16] See ibid, Pt. III.
[17] See ibid, p. 445.
[18] In his *Principles of Scientific Management*, Taylor considered how production should "scientifically" be organized by management independently of the knowledge of the workers. A critical and interesting account of Taylor's is contained in H. Braverman, *Labour and Monopoly Capital* (New York: Monthly Review Press, 1974).

principles:[19] (1) dissociation of the labor process from the skills of the workers, (2) separation of conception from execution, and (3) use of this monopoly over knowledge to control each step of the labor process and its mode of execution. These principles had not only the effect of controlling workers' effort. It monopolized working knowledge in few individuals and together with trade secrets law contributed to the protection of the private property of the knowledge of the firm.

Even if trade secrets could be seen as a form of corporate intellectual property, they lacked a key-factor distinguishing property from implicit or explicit contracts among the involved parties: the possibility of enforcing the rights "*erga omnes*" and not only "*in personam*" against the contracting parties. Property requires the involvement of a third agent, such as a State, which guarantees the owner's rights against all other parties. This universality of intellectual property makes it tradable and allows its inclusion in the capital of the enterprise. The full-blown institution of intellectual property changes the role and the rights of all parties.[20] With trade secrets obligations or restrictive covenants, anyone who discovers independently a technology used by others has the right to use it. By contrast, if a person has acquired intellectual property in a technology, even persons who have re-discovered independently that technology are forbidden to use it without the owner's permission.

As Radder points out, a product patent is a patent on the product as such:

> That is to say, it is valid for *any* known or unknown process through which the product has been or might be produced. Thus, with the help of the questionable distinction between the invention itself and the patent claims allegedly based on it, the protection acquired through a product patent goes far beyond what has been made available through the actual invention.[21]

Thus, a product patent effectively amounts to appropriating a concept because the patent claims made through a product patent are, effectively, conceptual or theoretical claims. According to Radder, this kind of privatization appropriates full, non-exhaustible potential of knowledge

[19] According to Braverman, ibid., p. 86, the analysis of Taylorim is essential to an understanding of the real-life capitalist economy because in Taylor's work "lies a theory which is nothing else than an explicit verbalization of the capitalist mode of production.

[20] This point is a particular application of the general framework developed by K. Pistor, *The Code*.

[21] H. Radder, "Which Scientific Knowledge is a Common Good?," *Social Epistemology*, 31 (2017), 431, 446–467.

on the basis of a limited scientific achievement and it prevents the (wider and possibly improved) realization of this potential by other researchers (including the present research workers if they leave the firm where they have contributed to the development of the product).

If firms are entitled to take ownership of the intellectual property developed by their workers, and can sell or license it to third parties, this entitlement tilts definitively the balance against employee's independence and in favor of corporate intellectual property.

Once trademarks, industrial designs, patents and all sort other intangibles have become property of the corporation, much working knowledge becomes specific to the corporation for legal reasons. The ex-ante rights on intellectual property of the corporation impose a tight constraint on its employees' liberties to use their working knowledge in other firms. With the ownership of these intangibles the firm may acquire a monopoly of some productive activities and their future improvements. Thus, it is not too surprising that intangibles have become the lion's share of the assets of big corporations and that, in the case of the top 500 corporations, their share grew from 17 percent in 1975 to 87 percent in 2015.[22]

A dramatic mutation of capitalism has occurred. Big corporations have moved from being rich in machines and other physical assets to being rich in intellectual monopoly and other intangible assets, which is a distinctive characteristic of a new form of intellectual monopoly capitalism.

The 1980 Bayth Doyle Act and the 1994 TRIPs agreement[23] (an annex to the institution of the WTO) marked two crucial steps of this dramatic mutation of capitalism. The first allowed the acquisition of private intellectual property rights for innovations developed with the support of public funding. The second introduced a much stronger legislation and enforcement for intellectual property at global level.

In this way, corporations have been able to exploit the huge economies of scale and of scope that arise when knowledge becomes a private input.[24] They have also been able to decentralize production to firms in

[22] See U. Pagano, "The Crisis of Intellectual Monopoly Capitalism," *Cambridge Journal of Economics*, 38 (2014), 1409–1429.

[23] The Bayth-Dole Act is US legislation dealing with intellectual property arising from government funded research. The TRIPs agreement is an annex to the institution of the WTO. For a more detailed analysis, refer to U. Pagano, "The Crisis of Intellectual Monopoly Capitalism," *Cambridge Journal of Economics*, 38 (2014), 1409–1429.

[24] In some other cases, this privatization is not even necessary. The infrastructures, used to exchange knowledge are characterized by such network externalities to be a natural monopoly needing very little legal protection.

low labor cost countries without the fear that their competitors could use their know-how.

According to Boyle a second enclosure movement has taken place.[25] The first industrial revolution capitalism was preceded by the enclosure of lands. Modern intellectual monopoly capitalism has been made possible by a second great enclosure, fencing ideas in privately owned fields. Even if there is some evidence against this thesis, as Ostrom suggests,[26] some theories claimed that land enclosures may have even prevented its over-exploitation by the commons crowding the land with an excessive number of animals. No similar claim can be made for the case of intellectual enclosures. Knowledge is a non-rival good, and its fields are not subject to overcrowding. By contrast, the privatization of the field of knowledge sets limits to its access, which decrease productivity and welfare. The agents are forced to specialize in activities based on narrow fields and suffer a dramatic squeeze of investment opportunities which Heller and Eisenberg have appropriately called the anti-commons tragedy.[27]

The so-called knowledge society emerges from the following paradox. The non-rival nature of knowledge, which could in principle favor small, and even self-managed, firms, is used to create artificial economies of scale which make cheap acquisition and defense of property rights possible only for big business. Absent knowledge privatization, the need to provide incentives to invest in human capital would be an argument favoring the labor-hiring-capital solution.

Because of the monopolization of intellectual capital the knowledge economy can become the least friendly environment for small labor-managed firms and an ideal setting for big corporations. Only the latter centralizing the ownership of much intellectual property can give a partial solution to the anti-commons problem.

[25] Boyle claims that we "are in the middle of a second enclosure movement." J. Boyle "The Second Enclosure Movement and the Construction of the Public Domain," *Law and Contemporary Problems*, 66 (2003), 33, 37.

[26] Ostrom provides a large number of cases in which commons for rival goods subject to overcrowding are successful. E. Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990).

[27] Heller and Eisenberg used this term to point out that, because of the non-rival nature of knowledge, the tragedy of the second enclosure movement had an origin opposite to the one that was supposed to justify the enclosure of land in the first enclosure movement. M. A. Heller and R. S. Eisenberg, "Can Patents Deter Innovation? The Anticommons in Biomedical Research," *Science* (May 1, 1998), 698.

The increased intensity of intangible assets has increased the degree of specificity of the assets of the firms. Trademarks, patents, reputation, copyrights, design and projects ownership and industrial secrets are often unique assets. Mainly for legal reasons, they cannot be replicated and have an unclear, and often lower, value outside the firm. Unlike, buildings, land, plants, industrial machines, trucks or airplanes, they do not have thick markets and cannot be used efficiently as collateral. Thus, the weightless economy makes traditional banking increasingly difficult and the equity–debt ratio increases. Because of the self-reinforcing process considered in section 4.3, the increase of the debt–equity ratio in turn favors the increase of asset-specificity.

The fact that intangibles have no thick markets is one of the factors that contributes to increase the volatility of the values of the companies. At the same time, the enormous growth of intangibles has greatly increased financial wealth and companies with a great percentage of intangibles are greatly valued on stock markets.

Financialization of the economy and privatization of intangibles have reinforced each other. In many ways they make two sides of the same coin.

When embodied in human beings or available as public goods, knowledge as intangibles cannot offer a significant basis for securing financial rights. By contrast, commodified and privatized pieces of knowledge become assets on which financial claims can be defined and traded.

In turn, the financialization of the economy induces companies to commodify their intellectual capital. The higher the intensity of private commodified knowledge relative to other types of knowledge, the easier it is to attract cheap finance. Thus, financialization of the economy and commodification of knowledge reinforce each other. The behavior of modern corporations is characterized by an increasing influence of the financial sector and by a high share of intangible assets.

The massive increase of financial wealth and intangible assets has not gone together with an increase of productive capital and of social wealth. Indeed the opposite has been true. The increase in financial wealth has often caused a decrease of total productive capital or, in other words, we have often had a form of capital-destructive financial wealth. As Stiglitz has observed:

> If monopoly power of firms increases, it will show up as an increase in the income of capital, and the present discounted value of that will show up as

> an increase in wealth (since claims on the rents associated with that market power can be bought and sold).[28]

By contrast, knowledge that is freely available increases output, but does not show up in balance sheets. Therefore, it would not normally be reflected in the national accounts as wealth. While increasing financial wealth, a process of privatization of knowledge could destroy productive intellectual capital, which becomes available only for a much-decreased number of uses. However, sooner or later, also the financial wealth of society will be threatened by the monopolization of the economy.

When IPRs are reinforced (as happened with the 1994 TRIPs agreements), the surpluses of the different firms are likely to diverge. Some firms enjoy a virtuous circle, where intellectual property induces them to develop new capabilities and, in turn, these capabilities induce them to acquire more intellectual property. Other firms become trapped in a vicious circle. They do not develop skills, because they lack the complementary intellectual property. At the same time, they do not acquire intellectual property, because they have not developed the complementary skills.

Because of IPR protection, many "tangible" production activities can be safely decentralized to low-cost countries, increasing even more the inequality among firms. The firms intensive in the types of jobs advocated by Taylor can be separated from those where more skilled activities take place. These jobs are done in firms which compete for the tasks outsourced by the firm holding the intellectual monopoly, and they become very precarious and poorly paid.

Unsurprisingly, there is a very high level of inequality among firms. As Schwartz points out:

> Using a standard measure for inequality, the Gini index (where 1 equals perfect inequality and 0 equals perfect equality), to assess the distribution of profit just within the [Forbes Global 2000] shows levels of inequality for profits that are significantly higher than any given national economy. The Gini index for the distribution of profits among the [Forbes Global 2000] over the ten year period 2005 to 2015 is .809. By comparison, some of the most unequal societies in the world, South Africa and Brazil, typically have Gini indices of roughly .600, and the highly egalitarian Nordic countries have Ginis typically around .250.[29]

[28] J. Stiglitz, "New Theoretical Perspectives on the Distribution of Income and Wealth among Individuals," NBER Working Paper 21189 (2015), 24.

[29] H. M. Schwartz, "Club goods, intellectual property rights, and profitability in the information economy," *Business and Politics*, 19 (2017), 191, 205.

Workers tend to share part of the benefits of the profits of their firm. Thus, the inequality in the profitability of the different firms causes inequality in the earnings of their employees. Virtually the entire rise in earnings dispersion in the United States from 1978 to 2012 between workers is accounted for by increasing dispersion in average wages paid by the employers of these individuals.[30]

In spite of all striking outcomes, these studies are based only on non-financial firms. We should add to this bleak outlook for (in)equality the fact the new intellectual monopoly capitalism had implied a shift from traditional banking to equity with additional adverse effects on wage dispersion. This has in turn changed the nature of the work in finance from routine business to hedging and other sophisticated activities. According to Philippon, the new setting of financial industry has contributed to increase the earnings of the individuals in this sector relative to other sectors. Philippon observes how workers in finance "earn the same education-adjusted wages as other workers until 1990, but by 2006 the premium is 50 per cent on average," with executives in finance earning "250% more than executives elsewhere."[31] Thus, the change in the nature of finance, associated to new intellectual capitalism based on intangibles, has contributed to increase even more the overall level of inequality.

High inequality not only involves an unjust distribution of income, which has devastating social consequences. It also has bad consequences at the level of the general economy. It gives more money to individuals who have a low need to consume and may be simply engaged in competition to overcome others in the wealth rankings. It is true, as Keynes observed: it is far better that an individual tyrannize over his bank balance than over his fellow citizens. However, savings are no guide for future consumption and investment. If no investment in productive capacity is made, the higher the saving the lower will be the future production that is available, and as a consequence the future savings that will be possible. Keynes' paradox of thrift is counterintuitive only because many individuals confuse an act of saving with a future demand for goods or an immediate demand for capital goods.[32]

[30] On this point, see J. Song, et al., "Firming up Inequality,' National Bureau of Economic Research Working Paper w21199 (2015).

[31] T. Philippon and R. Ariell, "Wages and Human Capital in the U.S. Finance Industry,"*The Quarterly Journal of Economics*, 127 (2012), 1551, 1605.

[32] "The absurd, though almost universal, idea that an act of individual saving is just as good for effective demand as an act of individual consumption, has been fostered by the fallacy,

The inequity in the distribution of tangible and intangible assets entails that money is given to the individuals who are less likely to specify an effective demand and more likely to increase their savings. However, it is difficult to maintain that excess liquidity in the advanced countries, arising due to a "saving glut" in the low-income countries, was the main cause of the recent financial crisis. In the advanced countries, the recycling of the savings of the low-income countries has, at most, compensated for the decrease in the savings of the high-income countries. In the high-income countries many people needed to borrow because globalization (and stronger intellectual property rights) allowed a decentralization of productive activities in the low-income countries, increasing income inequality in the core countries. At the same time, because of strong intellectual property rights, the low-income countries could not digest their own savings, which had to be recycled through high-income country firms, rich in intellectual property rights. Until the American corporations began investing in China, America (and in general the global economy) boomed.

However, *intellectual monopoly capitalism*[33] was doomed to have an investment crisis also in the intellectual property-rich countries. A reinforcement of intellectual property rights such as occurred with the TRIPS agreements has two effects on investments. The first is an incentive effect. Firms invest to get the benefits of future monopoly rents. The second is a blocking effect. The monopoly rights of other firms may make each investment risky because it may require technologies infringing the intellectual property rights of other firms.

The time profiles of the incentive and of the blocking effects of IPR reinforcement are different. The incentive effect is immediate. As soon as the reinforcement of intellectual property is introduced (and even before, when it is expected to happen) firms are pushed to invest in innovations that can be patented. The blocking effect comes later, when a substantial

much more specious than the conclusion derived from it, that an increased desire to hold wealth, being much the same thing as an increased desire to hold investments, must, by increasing the demand for investments, provide a stimulus to their production; so that current investment is promoted by individual saving to the same extent as present consumption is diminished.

It is of this fallacy that it is most difficult to disabuse men's mind. It comes from believing the owner of wealth desires a capital-asset as such, whereas what he desires is its *prospective yield*. Now prospective yield wholly depends on the expectation of future effective demand in relation to conditions of supply." J. M. Keynes, *The General Theory of Employment, Interest, and Money* (London: Macmillan, 1936), 210–212.

[33] On the nature and the crisis of intellectual monopoly capitalism see Pagano, "Crisis of Intellectual Monopoly."

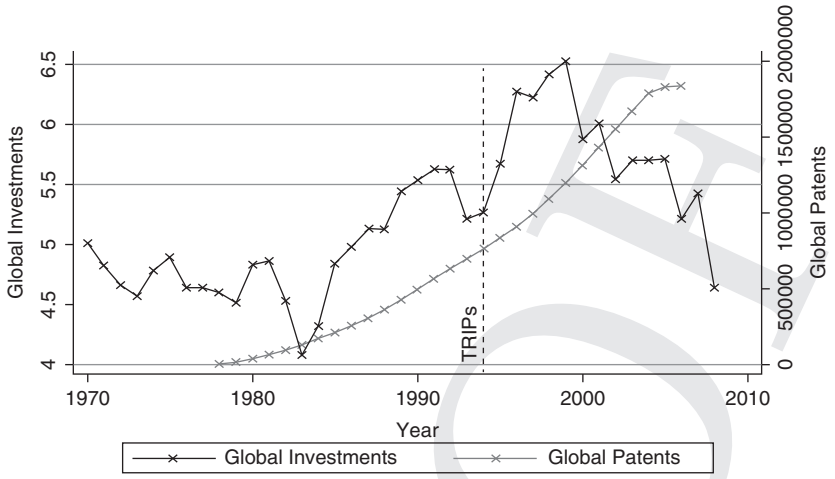

Figure 4.3 Trips and Investment Crisis

number of innovations has been patented and many technological paths are forbidden, or too costly, for non-owners.

Even if complex historical processes always have multiple causes, it is interesting that the reinforcement of IPR could explain both the investment boom of the roaring nineties and the investment famine of the 2000s, leading to the great recession. Figure 4.3 shows how the introduction of the TRIPs agreement was unsurprisingly followed first by a boom of global investment crisis.[34]

4.5 Property and Global Protectionism

While it is commonly accepted wisdom that the financial crisis was due to a savings glut, the crisis was more due to a famine of good investment opportunities than to an increase in the propensity to save.

The monopolization of the global economy has contributed to this famine of investment opportunities. In the crisis of the 1930s, protectionism was considered one of the worst consequences of the financial crisis. However, unlike IPR, even the highest tariff can at most protect the national industry against foreign competitors. In the recent downturn,

[34] Figure taken from F. Belloc and U. Pagano, "Knowledge Enclosures, Forced Specializations and Investment Crisis," *The European Journal of Comparative Economics*, 9 (2012), 445–483.

protectionism (in the new form of global IPR rights and costs) has been a cause instead of a consequence of the financial crisis. Because of the lack of good investment opportunities, a flood of savings rushed into the American housing market and other similar speculative business.

Tougher financial regulations have been seen as the main remedy to the financial crisis. The Dodd-Frank Act in the US contains a diluted requirement reminiscent of the 1933 Glass-Steagall Act. With some exceptions, commercial banks should not engage in proprietary trading. Enhancements to Basel II (before the crisis) and the adoption of Basel III (after the crisis) have increased the capital and liquidity requirement of the banks.[35]

These regulations are useful to restore some space for finance in a "banking equilibrium" that had been overtaken by the speculative mood of the pre-crisis economy.

However, the regulations cannot do too much to correct an investment crisis. In some cases they may have made banks too cautious during a period in which quantitative easing was being advocated to re-launch the economy. Low effective demand and the monopolistic nature of many intangible assets were as important in causing the crisis as the nature of the financial claims on assets.

4.6 Conclusion

Contemporary capitalism has seen an exceptional growth of finance, and is often defined as financial capitalism. Securitization and equity finance have gained an unprecedented role with respect to traditional banking. We have seen that this kind of financial capitalism could also be understood as the other face of intellectual monopoly capitalism. While financial regulations can improve the stability of contemporary capitalism, some of the characteristics of the financial arrangements are related to the assets on which the financial claims are made. Many underlying assets have become discounted rents of intellectual monopoly, which are poorly suited to secure loans granted in traditional banking. In this respect overregulating the traditional banking sector may simply have the effect of pushing the economy even further towards an equity-based (or possibly shadow banking-based) financial equilibrium, which would in turn

[35] On the flaws of the Basel regulations, see E. Avgouleas, *Governance of Global Financial Markets: The Law, the Economics, the Politics* (Cambridge: Cambridge University Press, 2012).

reinforce a security-based equilibrium. In this respect, it may be more attractive to regulate the intangible assets on which the financial claims are exercised, thereby taming the negative effects of intellectual monopoly.

Consider that IPRs may generate huge incomes for a monopolist but they depress the average returns of the economy and squeeze future effective demand by making the monopolist a lazy investor and by depriving competitors of valuable investment opportunities. Moreover, intellectual monopoly creates huge inequalities depressing the average propensity to consume.

To overcome these problems we need regulations that change the nature of the assets held. This could be done by the means of IPRs buy out and by introducing new international regulations.

In some cases, public buy-outs of IPRs could be useful. They could leave the former monopolies with more money and more competition and stimulate their investments. At the same time, competitors would be empowered to enter new markets and increase their investments.

The standard multiplicative properties of public investments would be reinforced by the intrinsic multiplicative properties of a public good such as knowledge. Keynes' multipliers can become super-multipliers in a knowledge economy!

More generally, National States must produce international regulations, concerning the levels of public spending on knowledge in the different countries. Public knowledge is a global common and each nation-state has the incentive to free ride on the public knowledge produced by other states. Free-riding on the production of public knowledge of other nations should be seen as a damaging form of unfair competition, as one country reaps the benefits of another country's costly investments. The WTO should be reformed in such a way that this unfair competition is tamed. The charter of the WTO should include rules stating that fair participation in international trade requires a GNP fraction of each member state to be invested in open science and to be made available to all countries as a global common.

Closed science and closed markets can be perverse institutional complements, organizing and shaping the nature of excessive amounts of assets. New institutional complementarities, based on open science and open markets should shape and organize an increasing numbers of assets, fitting a more equal and dynamic society. Regulations cannot only be

about the financial claims on assets. They should also be about the assets themselves.

Law will always be incomplete. However, in some fields, its enterprise (subjecting human behavior to rules) has barely started and its incompleteness is particularly painful!