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Fundamental instability: Why telecom is becoming a cyclical and oligopolistic industry

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Abstract

This essay analyzes the long-term lessons of the recent upturn and downturn in the telecommunications industry. It concludes that volatility and cyclicality will be an inherent part of the telecom sector in the future. To deal with such instabilities, companies and investors seek consolidation and cooperation. Government, too, is likely to stress stability more than before. Hence, an oligopoly is likely to emerge as the equilibrium market structure, and with it some regulation.

JEL classification: L63; L86; L96; L13; L16; O14; D43; E32

Keywords: Telecommunications; Cyclicality; Oligopoly; Regulation; Concentration

1. The new cyclicality

How fast things have changed. It seems only yesterday that the sky was the limit for the telecommunications industry. But then the electronics-based new economy became an old-style bust. According to the *Economist*, the telecom crash of 2001–2002 was 10 times bigger than the better-known dotcom crash.[1] The US telecom industry shed more 180,000 jobs in that period, lost over $1 trillion in stock market capitalization, and endured a continuous stream of bankruptcies. Losses were much greater than for the

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[1] The *Economist*, July 20 (2002).

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savings and loan banks debacle of the late 1980s. Parts of the industry are still mired in scandal. Worldwide, the industry accumulated over $1 trillion in debt, investment came to a standstill, and stock values declined by $4 trillion. As the number of regular lines dropped, network firms sought survival rather than expansion, capital investment dropped by half, the telecom equipment manufacturing sector collapsed, and telecom R&D withered.

The industry stabilized in 2004 and recovered somewhat, though not at the hyperactive level of the bubble years. But the real issue is that the telecom industry may well be entering a chronic pattern of volatility, with boom–bust patterns becoming a common occurrence rather than an aberration. The network environment is leaving stability and entering volatility. A pattern of ups and downs is emerging, a cycle.

Yet many participants and observers of the industry miss or deny the emergence of such volatility. They believe that the present downturn is merely a one-time accident, a rare confluence, a "perfect storm", and that things will in time return to their past stability because industry and government have learned from past mistakes (Blumenstein and Zuckerman, 2002). But if we analyze the drivers of the recent volatility, we must conclude that they will be with us into the foreseeable future, and volatility with them, just as they are in some other industries.

Business cycles are not new, of course. The Bible tells us of the seven fat years in Egypt followed by the seven lean years, and of Joseph who engaged in what we would today call counter-cyclical economic policy. Economic historians have identified 32 cycles for the years since 1857 (Zarnowitz, 1991). There have been 13 "official" recessions in the US since 1945. Expansions have become gradually longer, and contractions shorter and milder (Zarnowitz, 1992). One reason is that we know better how to deal with downturns through macro-economic policies, and how to mitigate their negative effects through social policies. A dampening of the business cycle has been a priority for all governments. But cycles have not disappeared.

Within the aggregate economy there are cycles for various asset classes and industries. These volatilities are interrelated in various reinforcing and offsetting ways. The swings of the economy as a whole are a composite of the moves of its various sectors and firms. Just as in the case of investment portfolios, the aggregate volatility of the overall economy should be lower than the average of the industry volatilities.

Some industries are more cyclical than others.[2] Telecom used to be less volatile than the economy as a whole. It grew steadily, with long planning horizons hardly ruffled by the business cycle. One company, AT&T, accounted before its divestiture in 1984 for 83.2% of network activity and equipment manufacturing, and provided stability, planning, and an industry-wide umbrella.[3] Its stocks with their steady dividends were treated by investors like bonds. The equipment industry, being globally stratified, was almost as stable as the carriers. But today, in sharp contrast, the telecom sector may well have become more volatile than the economy as a whole, more like the construction business and less like water utilities.

[2] One study of about 250 industries found that durable goods industries are three times as cyclical as non-durable goods industries (Petersen and Strongin, 1996).

[3] Details are in Noam (2007).

Has the telecom industry exhibited cycles in the past? We looked at US telecom industry data going back to its inception in 1875.[4] Access lines increased each and every year for over a century, interrupted only briefly in the 1930s, when the line count fell for three years of the Great Depression. Even under the extreme economic conditions that then existed, lines rose on average by 0.5% per year over the decade of the 1930s. The average annual growth rate throughout the 20th century, from 1920 onwards, was 3.7%. During the post-WWII period, there were 11 recessionary years with negative GDP growth. In each of those 11 years, telecom line growth was positive – above average four times, and below average four times. Similarly, the volume of actual calls (local plus toll) rose throughout the 20th century, with only minor dips in 1929–1932. Even over the 1930s, average call volume rose by 2.5% per year. US average annual growth over the century was 4.2%. In each of the 11 recessionary years the number of calls grew; in eight of those years it grew above average; in two cases growth was below average, but not by much.

The historical data also show that a third dimension of growth, telecom industry revenues, rose every single year, on average 8.4% from 1920 until the end of the century, with the exception of three Depression years. Of the 11 post-WWII recession years, only two witnessed below average revenue growth.

Thus, one cannot observe a direct correlation of telecom industry indicators – both of absolute numbers and of growth – with the overall economy for the 20th century. The state of the economy most likely played a role, but other factors tended to be stronger. For example, the positive network externalities that were the result of a preceding growth phase may have offset the negative income effect of a subsequent recession. Similarly, new technologies such as fax, online services, and the narrowband and broadband internet, caused growth spurts outside the general economic cycle. Even the 1990s boom in mobile wireless created for wireline access lines both a negative substitution effect – some users dropped their traditional phone service – as well as positive complementarities – people called more often. Thus, the growth of telecom in terms of number of calls or minutes has continued. But that does not necessarily translate into a growth in revenues if prices decline more rapidly than billable usage.

A related question is whether changes in the industry structure – from monopolistic to competitive – can be linked to the telecom industry's economic performance, and whether the industry structure causes long-term cycles. It is difficult to demonstrate a link econometrically, since there have been only two partly competitive periods in America's telecommunication sector (or in any other country): the liberalization period of the past several years, which is still unfolding, and (b) the early years of the 20th century, a period for which few financial data are available. Only anecdotal evidence can therefore be marshaled. In the United States, competitive communications lowered prices and tripled telecom growth from 6.3% in the 1880s to 21.5% in the 1890s (Brock, 1981). In Sweden, competition lasted from 1883 to 1918 and caused Stockholm to have Europe's lowest prices and highest penetration. Monthly rates in Stockholm used to be $40 under monopoly, and fell to $12 with competition (Noam, 1992).

[4] The information following is from US Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970*, Series R 1–12, Telephones and Average Daily Coinversations; Series R 17–30 Bell Telephone Companies; Series R 31–45 Independent Telephone Companies. Kraus International Publications, White Plains, NY, 1974. For post-1970 data FCC, see the annual reports by the FCC, Common Carrier Bureau, *Statistics of Communications Common Carriers* (*SOCC*).

Lower prices raised demand and generated positive network effects in both the US and Sweden. These phases were high growth periods, though not necessarily profitable ones. Anecdotal evidence points to some new entrants failing (one must distinguish entrants who venture into previously unserved areas, from those entering competitively to contest an already served franchise territory). There were also noisy complaints by incumbents about being harmed. Eventually all of the competitive entrants were forced out of business or acquired.

Thus, while one might discern in the early mist of the industry an embryonic boom and bust – which would strengthen the conclusion of this article – the data for that period is too sketchy to be conclusive, and the periods too different to be comparable. What we can observe is that the brief interval of competitive communications lowered prices and led incumbents and government to re-establish regulated industry oligopoly as monopoly. That system then lasted for three quarters of century. Today, similar dynamics are at work, after a much more pronounced boom–bust cycle.

2. Why cyclicality?

After almost a century of growth, the telecom industry was unprepared for volatility. The financial community was equally caught off guard, and its investment advice and valuations were wide off the mark. Being caught by surprise, a massive hand-wringing and finger-pointing ensued. It is therefore important to think about the causes of volatility, because if we do not know why something happened we cannot predict, prevent, or encourage recurrence. This is not to suggest that volatility is necessarily a bad thing. Too much stability can hold back innovation and price competition that benefit consumers. But it is helpful for participants to understand the dynamics of change.

There have been many competing explanations for economic fluctuations, from sunspots, to the alignment of the planets, and to the political election cycle. Over more than a century and a half, many distinguished economists have contributed their views. Most of these theories pertain to the aggregate (macro) economy rather than to a particular industry. But many of the dynamics apply also to an intermediate or "mezzo" level of the economy, to its major industries. Such a sector, too, may be affected by swings in aggregate demand and its secondary effects. It, too, is affected by lags in regularly or investment responses. Thus, briefly reviewing the larger theories and looking at their applicability to the telecom trends can provide insights into the dynamics of that industry.

2.1. The monetarist view

Cycles are caused by flawed monetary policy that causes instability. For example, if a central bank changes interest rates incorrectly, consumers and businesses get wrong signals and their expectations lead to reactions that set off instabilities (Friedman, 1982). This theory does not fully explain what happened to the telecom industry. Interest rates were moderate without stopping the contraction of the industry.

2.2. The Keynesian perspective

The key drivers of the economic cycle are fluctuations in the aggregate demand. Aggregate demand in turn is affected by the expectation of market participants which often

become self-fulfilling. Government must increase or reduce its own demand in order to dampen these private sector variations.

The overall economy slowed after 2002. But one cannot blame a drop in real consumer demand for telecom and the internet on the downturn. The usage of telecommunications in terms of minutes of long-distance, data communications, and wireless kept rising with double-digit growth rates. True, the growth rate in the internet subscribership was not been as torrid as before, but it still increased by about 20 million in 2001, followed by a healthy growth in broadband internet subscribership. Overall, one would expect telecom, as an essential service, to be less volatile than the economy. However, it experienced a much more pronounced boom–bust cycle.

2.3. Real business cycles theory (RBC)

This theory is a supply side story. For RBC advocates, cycles are mostly caused by random shocks and their impact on total factor productivity, and on flawed government policies in response. The internet was a positive shock, while September 11 was a negative one. For RBC advocates, causality does not run from consumption to output but the other way around. (Espinosa-Vega and Guo, 2001.) The RBC theory therefore rejects explanations based on consumer psychology such as "exuberant irrationality". RBC proponents believe that there is really nothing that governments can do about a cycle since it is based on random events.

How does this perspective fit telecommunications? Empirical studies show that single shock rarely trigger downturns of the economy. But a shock can topple an already weak structure. In telecommunications, several shocks occurred in the early 2000s and added their impact cumulatively. Local competition failed; long distance competition, on the other hand, worked only too well, lowering prices and profits; Wall Street became irrationally depressed when stocks declined from their unrealistic heights; governments extracted future expected profits by auctioning access to a vital resource, spectrum; regulators, protective of incumbents' ability to generate low-price service in high-cost areas, slowed down competitors; etc. But most of these events are not the kind of exogenous, technology oriented shocks that affect productivity, as hypothesized by RBC advocates. They are endogenous financial and institutional variables of the sector itself.

There is, however, one important factor that can be interpreted as a technologically based shock in telecommunications, if we take a generous definition of the term. That is the emergence of network technologies such as fiber-optic transmission cables, and of wireless distribution systems of that changed the fundamental economies of scale of the industry. On the supply side, the fixed costs of networks are rising and the marginal costs are dropping – strengthening the classic attributes of "natural" monopoly. Scale effects are compounded by indivisibilities or lumpiness in investment, which leads to short-term excess capacity (Darby, 2002). Hence, the advantage of being large are greater than before. As a result, for example, the market share of mobile wireless telecom providers (i.e., relative size) has been an excellent predictor of profitability (Waverman, 2002). For wireless firms, the average cost per subscriber drops with respect to both absolute size, and market share (Katz et al., 2002). Similar effects, for size, have long been identified for the telecom long distance market, as well as for cable TV (Noam, 1984, 1985). They generally show the elasticities of average costs with respect to size to be in the order of negative 5–15%.

For a long time, the size advantages in telecom were submerged under the accumulated inefficiencies of the incumbents. But having had to shape up under the pressure of real or threatened competition, these firms reduced their inefficiencies sufficiently for their scale to overcome the efficiency of small entrants. This is not the classic RBC story, but it is inspired by it.

2.4. Lag and accelerator models

Small changes in demand can lead to large expansion and investment. Where there is an adjustment lag, unanticipated shifts in demand can generate cycles of investment spending. These lags induce oscillation in the same way that slowly reacting bathroom shower controls induce cycles of hot and cold water. The famous "cobweb" cycle is a model of such overshooting. Industry examples are cattle, airline services, and office space – and now telecommunications. Here, investments take a long time to get on line, and disinvestments may take even longer. The lumpiness of investments in telecommunications coupled with an even slower regulatory and court system, makes the feedback loop very slow. On top of this is the "chicken and egg" problem of applications development depending on networked buildouts and vice versa. Since it is difficult to synchronize the two, developments often progress in spurts. The build-out of networks for trans-oceanic transmission, considerably ahead of demand, is a recent example, as may be the reverse, i.e., a shortage in a few years (Noam, 2004).

2.5. The Austrian theory

This view is focused on overcapacity, created for some reason – whether due to exuberance, excessive bank lending, monetary policy, optimistic projections of demand, or other factors. After an adjustment lag there is eventually a downturn. The pattern is one of boom, overcapacity, price war, bust, and shakeout. For Schumpeter (1939), periodic bursts of innovation generate a swarm of small new firms, and once their product fetches a high price that attracts entry, which expands output and lowers price. This goes on for a while. Industry growth rate then slows below that of individual firms, and a shakeout, winnowing and consolidation, occurs. Schumpeter's view of discontinuous changes rather than stable equilibria captures telecom sector, an industry that is operating in a technological environment governed by Moore's exponential "Law". This instability is exacerbated by the cost characteristics of network companies – high fixed-cost, low marginal cost, and network effects – which quickly casts aside firms that are smaller, or operate at higher cost, or whose products or processes are less innovative.

The Austrian view describes well the telecom industry, in which technological innovation led to the entry of many new network companies, and to the energizing of newly liberalized, established firms. These firms, in the aggregate, over-optimistically projected long distance market shares. Everybody built capacity to overwhelm competitors and to gain size. Capital expenditures in the telecom longhaul industry grew by an annual rate of 29% from 1996 to 2001 (New Pardigm Resource Group, 2002). The incremental cost of long-distance bandwidth fell by 54% annually (TeleGeography, 2004). Overcapacity was assisted by the lumpiness of telecom investments such as oceanic cables, and their irreversabilities (The *Economist*, October 9, 2003). It was further assisted by the tendency of Wall Street analysts to value a firm's progress by physical measures of its infrastructure such as

cell-sites or fiber-miles (TeleGeography, 2002). As the result of these factors, some carriers had over 90% of their fiber unused (''dark''), and prices for circuits dropped dramatically, by 50–70% each year during the period 1998–2003 (TeleGeography, 2004).

2.6. Network effects

The RBC theory discussed earlier assumes constant returns to scale. That is, if one increases the capital and labor inputs of the firms proportionately, their outputs would grow by the same proportion. But, as has been pointed out (Farmer and Guo, 1994), for network industries, this ignores what is known as the ''Metcalfe effect''. An increase in usage leads to greater utility of the product and to increased demand. And that, in turn, increases productivity and real wages and enables further consumption. Growth of other network participants is factored in as part of the value of the product, and leads to still further growth. At some point, however, the expectations of further growth decline, for example as saturation occurs. This leads consumers to reassess the value of the service, which in turn may reduce demand, creating some negative network effects, thereby reinforcing the downturn in demand. Thus, the dynamics that had pulled up the system now drag it down, strengthening oscillations. The Metcalfe Effect story fits well to the telecom and internet markets of the 1990s and beyond.

2.7. Credit cycles

Credit constraints and economic activity intertwine. If credit limits are tied to asset valuations, a rising stock market leads to an increase in collateral values and hence to an expansion in credit, to still higher valuations, and to further extension of credit (Greenwald and Stiglitz, 1993). The opposite is true for the period of contraction. Hence, financial markets may increase industry volatility. Investors exacerbated rather than moderated the boom–bust cycle of the telecom industry.[5] And the more recent investment boomlet into multiple broadband platforms suggests that the same may happen in the future.

2.8. Adding up the theories of cyclicality

Like the proverbial blind observers of the elephant, each of these theories appears to get something right for the telecommunications case, but without painting a full picture. Low interest rates encouraged one-investment. Demand growth slowed. Investment and regulatory lags prevented smooth adjustment. Network externalities and lumpiness in investments amplified the swings. Corporate and Wall Street malfeasance at first attracted excessive investment then repelled it when it was exposed. The regulatory process added delay and uncertainty. Industry managers miscalculated. Economies of scale and network externalities created strong incentives for growth strategies, at the expense of profitability. Financial markets encouraged this strategy.

The multiplicity of factors and the absence of a single primary cause has led many observers, as mentioned, to subscribe to a theory of the ''*perfect storm*'', according to

[5] The investor frenzy in other countries were not caused by fraudulent financial reporting (The *Economist*, October 9, 2003); nor were they a factor in similar developments in other countries.

which many random causes came together in a scenario that is too improbable to repeat itself for a long while.

Yet the causes of the telecom industry's recent volatility are not random but fundamental, structural, and inherent, and will remain so for the foreseeable future. They are the basic economic characteristics of many network industries: very high fixed cost, very low marginal cost, inelastic demand, lags in supply, network externalities, and technological uncertainties – all of which encourage firms to seek market share to gain economies of scale on the supply side and network effects on the demand side. This expansion makes sense for the individual firm; but in the aggregate, it leads to a major oversupply. Competition then drives prices down towards marginal cost and to levels which do not support total cost.

Eventually, demand catches up with supply, prices rise, new entrants emerge, supply expands, and then overexpands. A new cycle emerges, part of the dynamics of a "fundamental instability" in the telecom sector.

Harvard President and former Treasury Secretary Lawrence Summers and his co-author Bradford DeLong (2001) came to a similar conclusion for an instability of the New Economy as a whole:

> "In a 'Schumpeterian' economy... goods are produced under conditions of substantial increasing returns to scale. This means that competitive equilibrium is not a likely outcome: The canonical situation is more likely to be one of natural monopoly. But natural monopoly does not meet the most basic conditions for economic efficiency: that price equals marginal cost" (DeLong and Summers, 2001, pp. 33–34).

3. The implications of volatility

What are the options for telecom firms to deal with the new volatility in their industry?

- *Contraction in size*. A downturn makes cost-cutting more acceptable and provides an opportunity to change the internal structure and shed marginal operations. It also tends to defer new investments and innovation due to their riskiness. This strategy works best if one's competitors follow it too, and collectively reduce capacity and the rate of innovation.
- *Expansion in the downturn*. The opposite strategy may also make sense. The cost to acquire other firms or to expand by internal investment drops in a downturn. Expansion can be by internal growth or acquisition. Internal growth makes less sense than the acquisition of a competitor's capacity, because the latter strategy does not add to overall industry capacity but instead eliminates a competitor.
- *Diversification in product markets and geography*. Diversification reduces risk in some ways, but may also move a firm outside its core area of competency, which raises risk again. Expansion into other countries tends to increase exposure to political vagaries in areas where influence is lower. Vertical expansion may create economies of scope, but also reduce managerial flexibility to choose vendors and buyers. That is, expansion can also lead to a competition with one's own customers, and require changes in the firm's corporate culture which entails hidden costs.
- *Innovation*. A product differentiation by innovation would be a strong competitive strategy. This has led the telecom product to change over time. However, it is not easy for any network firm to gain a sustainable advantage in that fashion. Much of

technology is developed outside of the network operators by technology firms which offer their hardware and systems to all competitors.

- *Price cutting*. This strategy has drawbacks when price cuts are matched by competitors. It is at the heart of the telecom industry's recent problem: excess capacity leading to price deflation, and to prices that do not cover the substantial fixed costs.
- *Market power and oligopoly*. The implications are that a re-establishment of pricing power is a key strategy for the telecom firms in a commoditized market. With a monopoly out of bounds by regulation, the most likely scenario is hence an oligopoly. And to achieve that requires a consolidation of the industry to a limited number of firms.

3.1. Empirical evidence for industry concentration

Has consolidation, in fact, occurred in the telecom sector? That is an empirical question. There have been mergers, but also new entries, and new lines of business such as wireless telephony. In looking at concentration trends it is therefore important to be systematic. We researched concentration trends of six major telecom industries: local access, long-distance, international, cellular mobile wireless, paging, and radio common carriers.[6] These industries make up the bulk (85.9%) of the telecom services industry in the 20 year period investigated.[7] For each of these industries, we determine national market shares of the major firms over the period 1983 to 2004/5. We did so by finding the US revenue figures for the major firms, as well as the overall market size, for each year in the period, and for the six telecom industries. We could then calculate market shares, and determine the most common industry concentration measures, the "C4" which sums the shares of the top four firms, and the Hirschman-Herfindahl (HHI), which is the sum of the squares of the market shares of all firms. We then aggregated the six industry indices by a weighted averaging. The weighted aggregate HHI is defined as

$$\text{WAHHI} = \sum_{j=1}^{n} \frac{m_j}{\sum m_j} \sum_{i=1}^{f} S_{ij}^2 \tag{1}$$

where m_j = total revenue of industry j, S_{ij} = each firm's market share of industry j, n = number of industries in a specific subset of the information sector, f = number of firms in an industry.

And the weighted average C4 is

$$\text{WC4} = \sum_{j=1}^{n} \frac{m_j}{\sum m_j} \sum_{i=1}^{4} S_{ij} \tag{2}$$

The empirical findings, provided in Fig. 1, show the trends of concentration in the telecom industry. Both the C4 and the HHI indices tell the same story. The concentration of

[6] Industry definitions and revenue figures from FCC industry reports. Cable telephony and VoIP service providers are included as "other", since their market shares in 2004 and before were minor. Total telecom sector revenue in 1996 (mil $): 269,486. Percent of telecom services of total telecom sector in 1996: 85.9%. Total broadband revenues in 2004 were 3.2% of total telecom services. Broadband services were thus not a factor before 2004. Non-telecom industries are not included in this article, but are part of a larger study (Noam, 2007).

[7] Total broadband revenues in 2004 were 3.2% of total telecom services. Broadband services were thus not a factor before 2004.

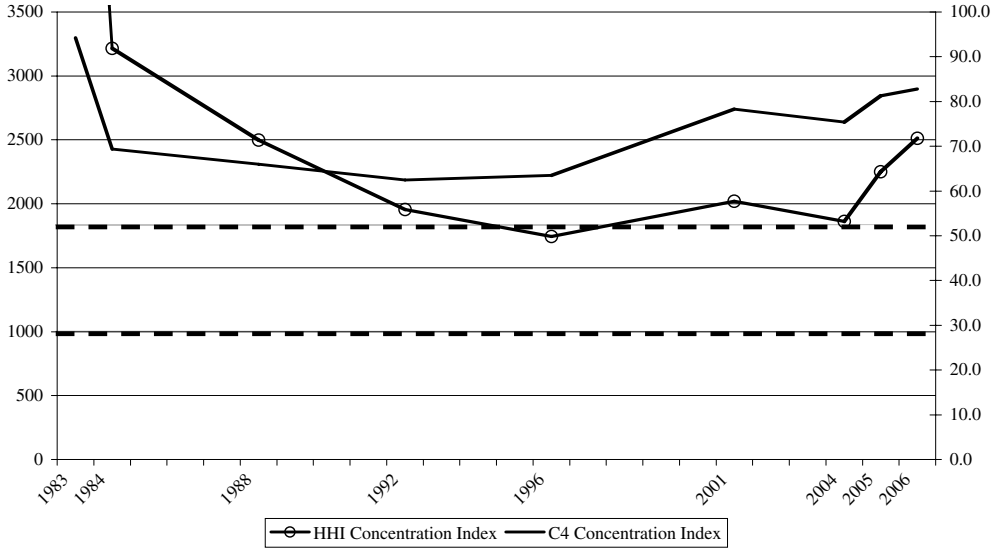

Fig. 1. Market concentration of the telecom service industries, 1983–2006, weighted average.

the telecom industry declined through the 1980s, after dropping precipitously through the AT&T divestiture. It increased again in the middle 1990s in the period of the 1996 Telecom Act and afterwards. In the early 2000s, the industry then fragmented again briefly, but that was mostly due to the growth in cellular wireless. The wireless sector, while actually increasing in concentration since the 1980s, was more fragmented than the wireline sector, and given its phenomenal growth it therefore temporarily pulled down overall concentration. After 2004, concentration in the two segments has become quite similar. The weighted average concentration of both wireline and wireless increased.

Fig. 2 presents market concentration trends in a somewhat different way, by showing the percentage share of the top five telecom firms of total telecom sector revenues. That enables us to observe vertical integration, in the sense of a company's participation across the entire telecom sector. We conduct similar calculations for the IT and the Mass Media sectors. The results show that the overall trends are also U-shaped. Market share of the top five firms in 2005 was about 60% of the total sector, higher than in 1988. We also observe from Fig. 2 that the share of the top five firms in the mass media and the IT sectors has been considerably lower than in telecommunications.

Returning to Fig. 1, an industry with an HHI over 1800 is defined by the US Department of Justice as a "highly concentrated industry". By that standard, the data shows that average concentration for the segments of the telecom industry is not merely high (well above 1800), but that concentration increased after the deregulatory 1996 Telecommunications Act from a score of 1828 – its lowest point in American telecommunications history[8] – to 2261 in 2005, almost as high as it had been in 1988.[9] (These numbers do not yet incorporate

[8] Until its government-mandated divestiture in 1984, AT&T's market share in the overall telecom market had never been below 50%. For local and toll service, see US Bureau of the Census, *Historical Statistics of the United States, Colonial Times to 1970, Series R 1–12, Telephone and Telegraph Systems, Kraus International Publications, White Plains, NY, 1974.* In the telecom equipment market, AT&T's Western Electric division was predominant.

[9] By the measure of the C4, concentration in 2005 was higher than in 1984.

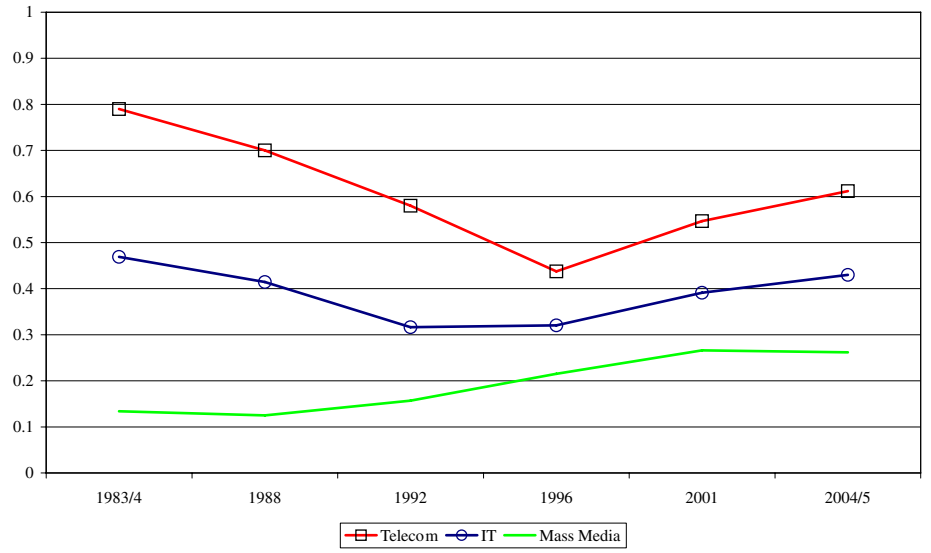

Fig. 2. Share of top five companies of telecom, IT, and mass media sectors.

the 2006 acquisition of Bell South by AT&T, as SBC had renamed itself, since that merger had not been approved yet. However, if we anticipate this merger, the HHI becomes 2494.) These developments were certainly not the intended effect of the Telecom Act.

There are two non-rival explanations for this post-1996 trend:

(a) The Act enabled expanded ownership by relaxing restrictions.
(b) The 1996 Act and its FCC implementations, by encouraging entry, created pressures on companies to restructure the industry in order to re-establish stability and lower competition in their markets.

There is little in the 1996 Act relating to telecommunications that supports explanation (a). Ownership restrictions were relaxed for radio and for television, but did not address the telecom industry. However, the effects of a greater opening to such competition was to drive companies to defensive moves along the lines of explanation (b), in order to re-establish pricing power, and consolidation became a major strategy.

Thus, we find empirical confirmation to our conclusion that the competitive opening of the telecommunications sector, with its tendency of price deflation and market volatility, is countered by the major companies' strategy of greater concentration. Liberalization leads to entry at the bottom and to consolidation at the top.

4. Conclusion

Overexpansion, by itself, is a hallmark of health, not weakness. At one time or another, there were hundreds of companies making automobiles, motorcycles, airplanes, tires, and microcomputers. There were dozens of telegraph companies in the mid 19th century before they consolidated into Western Union. One of the functions of slowdown is to enable

consolidation by weakening enough firms so that they seek partners and collaborators. This process reduces competition, and reduces the commodification that lowers profitability and future investments. This is likely to be a telecom firm's overriding strategy. The volatility of the industry will therefore lead firms to consolidate, reduce capacity expansion, and raise prices.[10]

For government policy, our analysis suggests several alternatives. The first alternative is to rely on competition and to leave things alone. There is, after all, nothing necessarily wrong with volatility or right with stability. However, such a hands-off policy is less likely to be chosen by politically sensitive regulators when downturns persist, when essential service providers falter, and when service quality deteriorates.

The second option is for government to take an activist approach to the sector and try to raise it from recession. This policy would involve a variety of interventions, especially in retail and wholesale pricing. Such regulation could assure firms' profitability, in the way that rate-of-return regulation had assured a "fair return", or in the way that inter-carrier transfers subsidized high-cost rural carriers. Other types of intervention would be an industrial policy that creates or subsidizes demand, outright government investments, or the favorable granting of spectrum licenses. A related strategy would be to automatically adjust existing rules and requirements over the business cycle: to make them more lenient in a downturn, and more restrictive in the boom.

The third basic policy option is to let the telecom industry stabilize itself through concentration. And this seems to have happened implicitly, by government accepting mergers that would not have been approved earlier. Such a policy spells out a departure from the regulatory philosophy of the past 25 years, which was based on an active creation and promotion of a competitive market structure.

The structural volatility of the telecom sector therefore points to an equilibrium scenario of oligopoly, not to the type of aggressive competition that would lead to a rapid withering away of governmental regulation.

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[10] A positive technology shock might also do the job, but one cannot base the future of essential infrastructure industries on unexpected events.

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