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Introduction

Purpose, research questions and research methodology, outline of the study

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"*Every cloud has a silver lining."*

1 Context

In the period 1950-1970 the developments in the telecom sector are best characterized by the terms: stable, steady and predictable. In terms of change this was truly *evolutionary.* However, a new period started in the '80-ties: a period of *revolutionary* change. Initiated by de-regulation in the '70-ties[1], the introduction of new technologies, such as cellular and fiber optic communications, and fuelled by the widespread use of the Internet an e-world was emerging that seemed unprecedented in terms of growth. The growth attracted many and big money was flowing into the ICT sector. New e-world "click & order"- companies quickly surpassed the old-world "bricks & mortar" - companies in share value. Many new businesses were started through fresh inflow of venture capital. Wave after wave of new telecom operators emerged to challenge the *status quo* of the incumbents. Investments in the industry soured. Being a player in the future of the mobile e-world became a must. Auctions for 3G radio spectrum became huge cash generators for national governments.

Until the wisdom behind these huge valuations became questioned; when Return on Investment was re-visited and Return on Vision became out of vogue, the boom period came to an end. In April 2000 the Internet bubble collapsed, having started in 1995.[2]

To adjust company operations to the new realities of the market over 485,000 jobs have been eliminated or announced to be eliminated in the telecommunications industry for the period July 2000 until February 2002 (Financial Times, 2002).[3] Measured from 2000 until 2002, 94 telecommunications companies defaulted (OECD, 2003 p16), including big first-wave new entrants such as Global Crossing and established firms such as WorldCom, the single largest default at approx. US$ 31.8 billion. And the impact has not remained restricted to the telecom and internet sector. As major institutional investors, such as mutual funds and pension funds, have participated in the bubble, the fall-out is affecting the public at large.[4]

From the perspective of a free market economist, bubbles are to be considered as natural market phenomena, and the crash is expected to provide for the necessary correction on the excesses that were part of the boom period. Hence, the recovery should run its course without intervention.

However, recognizing the special features of telecommunications as a network infrastructure, a *laissez-faire* attitude may not be the most desirable policy to be pursued. Consider in this respect the high expectations that surrounded the recent liberalization of the telecom sector. Politicians may perceive the current state of affairs in the sector as a 'market failure' and may be inclined to intervene, as has been the case in other liberalized infrastructure industries.[5] Furthermore, European government leaders agreed to a long-term goal of establishing the EU as a leading region in the global Information Society.[6] The related Action Plan calls for the formulation and implementation of national policies that aim at the realization of an ubiquitous broadband infrastructure with access for all European citizens. The

realization of this Plan may be frustrated by the recessive period that followed the crash.

Therefore examining and assessing the impact of the Internet bubble on the development path of the telecom sector and exploring the implications for the aftermath is expected to provide valuable insights for policy makers and strategists participating in the sector.[7] That is the 'external' aim of this research project. The 'internal' or scientific aim is to contribute to the understanding of sector development, the phenomenon of bubbles and the long wave in economic development.[8]

For the purpose of this project the telecom sector is defined as the collective of establishments concerned with: telecom equipment, including the related software and services, telecom (network) operations and telecom services provisioning. A reference to the Internet implies the infrastructure, consisting of transmission paths, access equipment and routers, that connect all types of computers and appliances, and that use the Internet Protocol (IP) for the purpose of information exchange. It implies the application of the world-wide-web (the Web), the associated hypertext mark-up language (html), the browsers and search engines, as well as the associated cultural aspects such as 'always online'.

2 Exploring the nature of the project

As a first order of approximation explaining the impact of the Internet bubble on the development path of the telecom sector can be considered as "a bubble superimposed on an otherwise normal course of development". This would suggest a focus of the research project on the bubble phenomenon, assuming the 'normal' course of development being commonly understood. However, this approach defies reality.

Firstly, the bubble coincided with a process of major change in the institutional environment: the process of liberalization of the telecom services sector, and in particular the privatization of the incumbent telecom operators in Europe.[9] The process of privatization changed the 'rules of the game' for the managers in the firms affected. They became subject to the expectations of the 'stock market' and were rewarded accordingly. Moreover, the opening up of the local access through the Telecom Law of 1996 in the US[10] and EU Council Directives of 1996, aiming at full competition by January 1998[11], significantly lowered the entry barriers to the sector and this resulted during the boom period in many new operators entering the market.

Secondly, advances in telecom technology have caused and are causing major shifts in the industry, from fixed to mobile, from circuit switching to packet switching, and from copper to fiber. Moreover, in the mobile sector handsets became subject to fashion and evolved to life-style products, further increasing the rate of innovation. These regime changes or paradigm shifts have a significant affect on the prevailing business models in the industry.

Thirdly, the bubble is not necessarily an isolated phenomenon, but can be considered part of a broader process of change. The nature of the telecom industry

with deep investments and long pay-back times, suggest that the industry is in principle susceptible to an industry cycle (De Wit, 1994). Considering the very recent liberalization of the telecom services industry, this phenomenon can only be emergent. An assessment of a possible cyclical nature of the industry may inform us on the development path of the sector in the aftermath of the bubble.
A further study of cycles and waves brings us to the notion of the Kondratieff cycle and its relation to technological innovation. The Kondratieff cycle or Long Wave is of particular interest through the interpretation by Freeman, Louçã and Perez (Freeman and Louçã, 2001; Perez, 2002). The model of the 'Great Surges'[12] puts the Internet bubble at the end of the 'installation period' of the new techno-economic paradigm of the Fifth Wave. The period we are in currently is the 'transition period' characterized by instability and recession. This period will give way to the 'deployment period' in which the full potential of the new techno-economic paradigm will be exploited, and this may give rise to a period of prosperity - a Golden Age. Whether this prospect will materialize is considered subject to the actors establishing the necessary adjustments of the institutional environment conducive for the new paradigm to be fully deployed.[13] "As each technological revolution is different, each paradigm unique, each set of solutions needs to be coherent with the problems to overcome and with the logic of the techno-economic paradigm, its opportunities and its best practices" (Perez, 2002 p 170), an analysis of the transition from the 'old' to the 'new' paradigm may provide an appropriate context for policy development in the aftermath of the Internet bubble.

In observing reality, in particular during a dynamic period, the cause-and-effect flow is not always unambiguous, i.e. what should be attributed to the 'normal' development path and what should be attributed to the bubble phenomenon. The use of controlled experimentation, as would be the standard approach in such cases in the physical sciences, is not feasible in the social realm as it tends to influence the outcome. Therefore the availability of a 'stylized model of euphoria' is expected to support the examination and assessment of the impact of the Internet bubble on the development path of the telecom sector. Such a 'stylized model' will be developed as part of this research project, using concepts from literature and historical information on bubbles. This 'stylized model' can subsequently be used to describe and explain the Internet bubble and to explore its impact on the development path of the sector.
While all bubbles have had a significant impact on the financial economy, only a few have had an impact on the production economy in general and on the development of network infrastructures in particular.[14] The Rail Road mania around 1840 provides a striking parallel with the recent bubble developments, and will be explored to provide further insights into the development path of the telecom sector in the aftermath of the Internet bubble.[15]

What the important implications of the Internet bubble on the development path of the telecom sector are may be perceived differently depending on the vantage point of the various actors involved in the sector. A distinction can be made