

Badran

Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries

**COMPETITION IN TELECOM SERVICES: A STUDY ON UNBUNDLING
POLICIES OF LOCAL LOOP WITH AN EMIPRICAL STUDY ON
BROADBAND PENETRATION IN EGYPT AND SOME EMERGING
COUNTRIES**

Monda Farid Bardan

*Faculty of Economics and Political Science,
Cairo University*

COMPETITION IN TELECOM SERVICES: A STUDY ON UNBUNDLING POLICIES OF LOCAL LOOP WITH AN EMIPRICAL STUDY ON BROADBAND PENETRATION IN EGYPT AND SOME EMERGING COUNTRIES

- Topic Area, Research Questions and Rationales for the Work:

This dissertation reports multidiscipline research work that applies econometric methods to this important telecom services problem. As such, it imposes difficult prerequisites, since an updated working knowledge about the technical field and business of telephone services must first be acquired, in order to specify the current problem for econometric research and, to apply the correct and suitable economic analysis techniques, and evaluate the obtained results.

The Public Switched Telephone Network (PSTN) represents an infrastructure of huge investment. For example, the British Public Switched Telephone Network is valued at \$21 billion. Traditionally, telecom services were provided by the state as monopoly. However, this has changed to competition, as it has been established that competition should be introduced in the public telephone services in order to secure innovation and welfare of the consumers.

A national regulatory authority has been established in many countries, that sets rules for competition between service providers in telecom services. Further the regulatory authority forces the incumbent to separate bundles of subscriber lines from the incumbent network, and leases the subscriber lines to new entrants or service providers at low cost such that the latter avoids building a new network from scratch at high cost. This process is called local loop unbundling or (LLU)

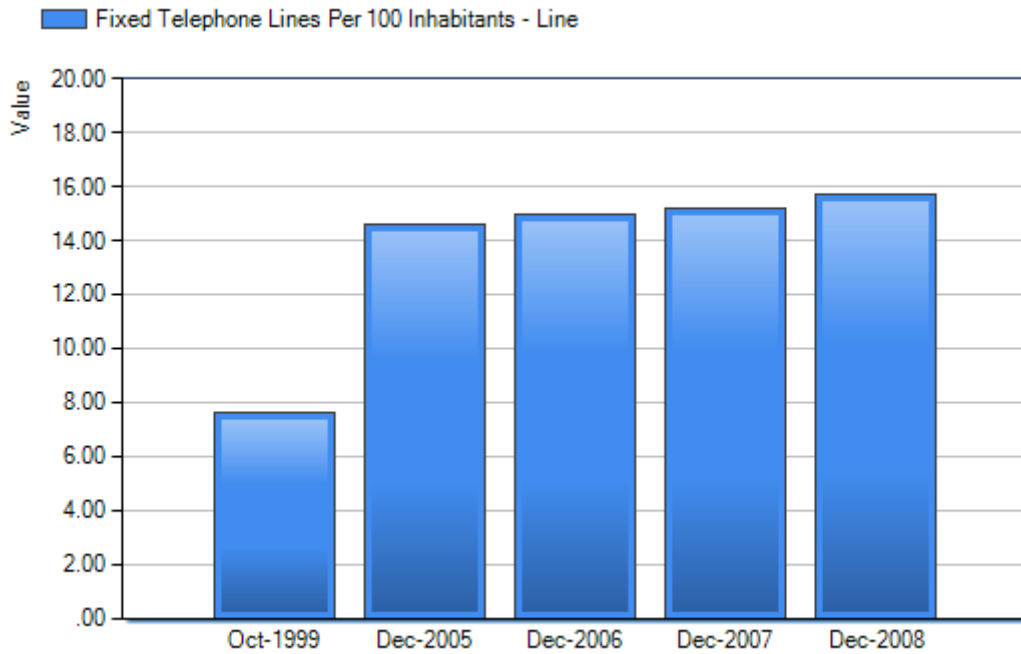


Figure 1: The development of fixed lines per hundred inhabitants in Egypt
Source: Ministry of Communication and Information Technology, Cairo

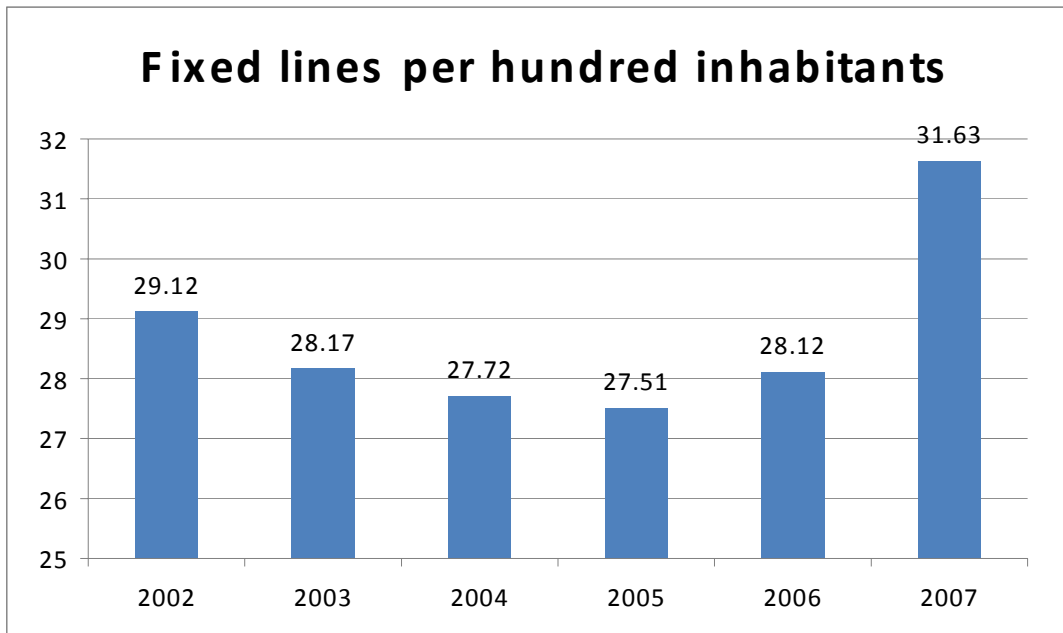


Figure 2: Development of fixed telephone lines per 100 inhabitants in UAE.
Source: ITU

1. The local Telephone Network:

Subscriber lines consists of 2 isolated wireline made of copper, that carries speech signals in 2 directions between the calling and the called subscriber.

Each subscriber is connected to the local exchange (LEX) through the subscriber line. The exchange connects the calling and called subscribers together. Subscriber line (local loop or last mile) can be a few hundred meters or a long line of 1.5 km.

The subscriber network amounts to about 40% of the cost of the telephone service equipment in the local telephone network. Therefore any additional use of the resources of the telephone network would be great advantage, especially introducing Internet services to millions of telephone subscribers at low cost.

This has contributed greatly to the popularity of the Internet in many countries. The simplest method to achieve Internet connection has been using modem with the PC user. The modem converts the PC data to the frequencies used on subscriber line and vice versa.

However, only relatively slow speeds by the modem could be used for the connection to the Internet. Thus considerable time could be wasted by the user in order to download large data files from Internet websites.

The solution for this important problem has been developed, which is based on utilizing the higher frequencies of the subscriber line, that are not used for speech telephony, such that this application will not affect the speech signals of the telephone. This is called Asymmetric Digital Subscriber line, where a high data rate is provided to obtain large volumes of data from the Internet(download) and relatively low data rate to provide low speed data from the subscriber PC to the Internet(Upload), for sending requests, e-mail or surfing the Internet.

For this purpose, the subscriber line usage is split such that the lower frequencies are used for the subscriber telephone services, while the high frequencies would be used for the introduction of high speed Internet service.

It is the high speed Access service by ADSL to the Internet that has contributed greatly to the widespread of many different e-economy services such as e-commerce, e-banking, e-government, etc.

The separation of voice service and data can be used such that the telephone service provider, the incumbent telephone company, can continue to provide the voice service while separate independent service provider, a new entrant, can use the high frequency of the subscriber line to provide the high speed Internet service. Such process is called line sharing which is a type of local loop unbundling (LLU).

Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*

- Research Methodology including conceptual framework used and research methods employed:

Several diverse factors (indicators) affect the wide usage of the Internet using High Speed Internet Access, ADSL, in practice such as, *Economic indicators* include data for *Gross Domestic Product per capita* (GDP per capita) in current prices (\$), GPD per capita using the PPP method and the GNI per capita. *Infrastructure indicators*: Main fixed subscriber lines per 100 inhabitants (Teledensity), *Internet penetration indicators*: *Internet host*, *Internet User per 100 inhabitations* , PCs per 100 inhabitants. International Internet bandwidth measured in Mbps, tertiary education, population density, price of local call $P(t-1)$,

- **Econometric study** is the science and art of using economic theory and statistical techniques to analyze economic data.
- A **panel data** or longitudinal data set is one that follows a given sample of individuals over time and thus provides multiple observations on each individual in the sample.
- Advantages of panel data: Panel data usually give the researcher a large number of data points which leads to increase the degrees of freedom and reduce the collinearity
- **Data Sources**: ITU database and Eurostat website and Econstat website.
- **Data Description**:

Economic indicators include data for **Gross Domestic Product per capita (GDP per capita)** in current prices (\$), GPD per capita using the PPP method and the GNI per capita. These were obtained from the Eurostat website. GNI comprises of the total value of the goods and services produced within a country and income received from other countries (interest and dividends), less similar payments made by other countries. The PPP method is the purchasing power parity method. An economic theory that estimates the amount of adjustment needed on the exchange rate between countries in order for the exchange to be equivalent to each currency's purchasing power.

Infrastructure indicators: Main fixed subscriber lines per 100 inhabitants (Teledensity). Fixed lines are telephone mainlines or landlines connecting customer's telephone to the public switched telephone network, the data were obtained from the ITU database.

Internet penetration indicators: **Internet host** (ITU 2006d) refer to the number of computers directly connected to the worldwide Internet network. Note that Internet host computers are identified by a two-digit country code or a three-digit code generally reflecting the nature of the organization using the Internet computer. The number of hosts is assigned to economies based on the country code although this does not necessarily indicate that the host is actually physically located in the economy. In addition, all other hosts for which there is no country code identification are assigned to the United States. Therefore the number of Internet hosts shown for each country can only be considered an approximation. Data on Internet host computers are obtained from Internet Software Consortium and RIPE (Réseaux IP Européens).

Internet User per 100 inhabitants is based on nationally reported data. In some cases, surveys have been carried out that give a more precise figure for the number of Internet users. However surveys differ across countries in the age and frequency of use they cover. The reported figure for Internet users—which may refer to only users above a certain age—is divided by the total population to obtain *users per 100 inhabitants (times hundred)*.

PCs shows the estimated number of Personal Computers in terms of **PCs per 100 inhabitants**. The figures for PCs come from the annual questionnaire supplemented by other sources. Again, this could not reflect the actual usage of PC's in these set of countries as explained below.

International Internet bandwidth measured in Mbps, refers to the capacity which backbone operators provision to carry Internet traffic measured in bits per second. This indicator is intended to represent the *quality* of the experience of Internet users within a country. If the experience of an Internet user in a country is poor, because of slow speed, then either people will not use ICTs, or they will not be able to use them effectively and creatively. In many developing countries, most Internet access is to sites abroad and therefore the amount of international bandwidth has a major impact on performance (ITU 2005).

In addition the **price of local call P(t-1)** was added in estimating the model lagged by one time period, as a proxy for the price of substitute(dial up).

Z_{it} refer to the unobserved variable that varies from country to another but does not change over time e.g.: cultural differences toward broadband penetration.

Table 1: Description of the Variables and their expected signs:

	The control variables	Description of the variable	The expected signs A priori
Economic Indicators	INC	GDP per capita measured in US\$ or GDP per capita using PPP GNI per capita	Positive
Education Indicators	SCHOOL ENROLLMENT	% of population who have completed their tertiary education	Positive ¹
ICT Indicators	PCS/100	Pcs per hundred inhabitants	Positive
Demographics Indicators	POPD	Population density in square km	Positive

¹ This hypothesized relationship is made by Gabel and Kwan (2000) and Madden, Savage, and Simpson (1996). Both studies uncover the anticipated coefficient, however, only the latter study finds a statistically significant relationship.

Internet penetration Indicators	INTERNET USERS	Internet User per 100 inhabitants	Positive
Infrastructure Indicators	FIXED LINES/100	main telephone lines (fixed lines) per 100 inhabitants	Positive
Internet penetration Indicators	HOSTS	number of computers directly connected to the worldwide Internet network	Positive
Prices Indicators (price of dial up a substitute for BB)	P-1	Price of a 3-minute fixed telephone local call (peak rate telephone –US\$) one year lagged	Positive
Capacity of the Internet	International bandwidth	International Internet Bandwidth (Mbps)	Positive
Broadband indicators	Dependent variable BP	Broadband penetration per 100 inhabitants	-----

Presentation of the Results:

Table 7: Factors (Indicators) affecting broadband, comparison and summary

Independent variable (indicators)	Previous study Bauer	Previous Study Ferreruella	Arab & Emerging Countries	Comment
1.Income GNI /capita	Significant/not significant		Significant	In 5 models Depending on the model
2. School Enrollment		Significant	Significant	
3. Population Density	Significant	Not significant	Significant	
4. Fixed lines /100			Significant	
5. Internet hosts		Not Significant	Significant/ not significant	In 3 models Depending on the model
6. Price of local call(dial	Significant		Significant	

Independent variable (indicators)	Previous study Bauer	Previous Study Ferreruella	Arab & Emerging Countries	Comment
up)				
7. PC/100			Is not a reliable indicator	
8. Internet users		Significant	Significant	

Legend

For Arab and Emerging countries, ITU statistics is the main source.
 Panel data for 22 countries from the years 2002-2005. Fixed effect model.
 Bauer & al: 30 OECD countries for year 2001.
 Ferreruella & al: 30 OECD countries for the years 2000-2002.

Notes:

1. Bauer & al used other indicators that include: price of broadband, preparedness, competition and dummy variable for policy regimes.
2. Ferreruella & al used other indicators that include available bandwidth per \$, lagged variable of DSL enabled Local loop, Unbundled local loop/100 access lines, monthly price of internet access and % of homes served by cable TV network.
3. For Arab and emerging countries, Indicators used in the table are mainly according to ITU available data.

Conclusion and Policy Recommendations:

Findings:

1. FALL OF NATURAL MONOPOLY IN PUBLIC TELECOM SERVICES:

Due to recent developments on electronics and digital computer technology, new generations of Telecom systems with increased facilities and reduced cost, have made competition economically feasible in the public telecom services. The arguments of natural monopoly in telecom services no longer apply.

2. ROLE OF SUPPORTING POLICIES RELATED TO UNBUNDLING:

Supporting policies to local loop unbundling were investigated and analyzed, including tariff rebalancing, collocation and interconnection.

Rebalanced tariffs could be expected to encourage investment by the incumbent. Interconnection requires the setting up of the right prices or rates for the unbundled network elements, to ensure interconnection, and investment in telecom infrastructure. Collocation request to the incumbent could delay the operation of the new entrant.

3. ANALYSIS OF UNBUNDLING OF LOCAL LOOP HYPOTHESIS:

The Telecom Act of 1996 introduced mandatory unbundling in USA and EU and New Zealand, at lower rates for unbundled subscriber lines, for new entrants to enhance competition in the vast local subscriber telephone service. Four arguments were stated as hypothesis for the mandatory unbundling. Notice that in a forthcoming book published by the Brookings Institution, Robert W. Crandall explained that the loss of end-user subscribers to CLECs reduces ILECs' revenues by more than their costs.² Crandall found that, whereas ILECs lose roughly 60 percent of the revenues associated with a given line when provisioned on an unbundled, rather than retail, basis, the avoided costs of customer service and marketing are only about 10 percent of the Bell companies' total costs.³

4. From the economic perspective, it seems obvious that broadband penetration is determined by the controlled variables, also called indicators, that are referred to in the literature and theory. However, in this paper we have proven that income is not the most important factor determining broadband uptake in the emerging countries.

This is due to the leapfrog phenomena that characterizes these countries and that the externalities and spillover effects that is related to ICT diffusion, and to the increased presence of FDI in the emerging countries. In addition, although the positive relationship between PC per 100 inhabitants and broadband uptake is expected and exists in developed countries, in the case of emerging countries, the independent variable PCs per 100 inhabitants, given by ITU cannot be considered as a true value and hence does not give the true effect on broadband penetration. A different method to assess the actual value of this indicator in emerging countries is needed that would take into account the public usage of broadband internet access at low cost, such as internet cafes, schools, clubs and public libraries. Other factors/ indicators that seemed to impact broadband uptake in these set of emerging countries other than income include tertiary education and population density.

5. It is found that the deployment of more fixed main lines would increase broadband penetration. Thus governments should expand the existing public switched telephone network and utilize the latest technologies in this field. Furthermore, governments can explore the option of leasing the subscriber lines to competitors to open new markets for potential entrants in this telecom market segment. The issue of "build or buy" has caused a big debate among Telecom economists and policy makers regarding the advantages and disadvantages of allowing service based competition like local loop unbundling. Governments in these countries should definitely explore the option of service based competition more seriously. A set of policies like

² Robert W. Crandall, *Competition and Chaos: The U.S. Telecommunications Sector Since 1996* (Washington, DC: Brookings Press 2004). [hereinafter *Competition and Chaos*]

³ Ibid

Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*

tariff rebalancing, collocation and interconnection arrangements should be addressed before the commencement of the unbundling of local loop policy.

6. Countries with high population density, should find it easier to increase broadband uptake compared to population that is scattered like in rural areas *ceteris paribus*. This is due to the fact that a large number of people would be connected to the telephone exchange and thus it would be easier to a new entrant to lease the local loop from the incumbent telephone company and install his new additional (ADSL) equipment. In densely populated areas, i.e. urban areas, the distance between the local exchange and the subscriber i.e. the subscriber line is short which allows a better quality of broadband service to the end user.

7. The set of countries that constitute our sample in this research are unique in that they are the target of many FDI (foreign direct investments) and thus steps are taken toward transforming these economies to new economies by finding incentives to increase broadband uptake. This approach is considered an important signal to these new investors. Measures taken to accelerate this process would indicate how serious these economies are in entering the new paradigm of knowledge -based economy.

Thus it is imperative to determine exactly what enhances broadband penetration, especially given the idiosyncratic features of emerging economies.

8. Increasing broadband uptake can be mainly realized by the following incentives:

1. Bundling of services, such as offering telephone line plus broadband access to Internet ADSL at significantly reduced price. Introducing triple play services on the subscriber line and promoting digital TV as a revenue source for the fixed line operator. These would however depend on the distance of the subscriber line from the local exchange and the quality of the copper line. Reducing cost for the second line would also be effective. This would lead to reduced prices for the consumers and reduce churn.
2. Increasing competition between broadband service providers.
3. Reducing the monthly rates of increased speed Internet access using ADSL.
4. Increasing awareness of the benefits of ADSL to the society.
5. Increasing the local content on the internet so to attract more users in an attempt to find the killer application that would attract users to indispensable ADSL experience.
6. Adopting convergence between wireless or mobile and fixed service⁴.

The results obtained in this multidiscipline research work presents a valuable contribution from Cairo University to the efforts of government to promote economic and social development by enhancing modern IT and telecom facilities.

Suggested future econometric research:

⁴ OECD (2007), "Mobile Multiple Play: New Service Pricing and Policy Implications", OECD Digital Economy Papers, No. 126,

Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*

This research has proved that econometric studies are very rewarding in telecommunication services development. Related to the covered research work in this dissertation, the following new research areas are suggested for future econometric research.

1. The effect of Arabic content on broadband penetration in the Arab countries.
2. The debate on various methods of pricing of unbundled network elements and
3. The inter-platform competition vs. intra- platform competition in emerging countries.

References:

1. Alabau, A. (2006) "*The European Union and its electronic communications Policy, thirty years in perspective*" Spanish Vodafone Foundation.
2. American Bar Association (2006) "*Telecom Antitrust Handbook*" Section of Antitrust Law, American Bar Association.
3. American Chamber of Commerce in Egypt, (2007), "Information and Communications Technology Developments in Egypt", Business Studies& Analysis Center.
4. Antonellie , C., Patrucco, P.P. (2005), Broadband in Italy: timing in intermodal rivalry, Università di Torino, Department of Economics Working Paper, Working paper No. 05/2005
5. Armstrong, Mark, Sappington, David E. M., (2005) "*Recent Developments in the Theory of Regulation*" Forthcoming in the Handbook of Industrial Organization (Vol. III),
6. Armstrong, Mark, and Sappington ,David E. M., (2005) "Regulation, competition and liberalization, Journal of Economic Literature, Vol. 44, issue 2.
7. Aron, D.J., Burnstein D.E., (2003), Broadband Adoption in the United States: An Empirical Analysis, paper prepared for presentation at the 31st Research Conference on Communication, Information and Internet Policy, September, Arlington, Virginia.
8. Badran, M.F., (2001) "Problems in the deregulations of the local telephone Market", Paper presented to Department of Economics, Georgia Sate University, USA, unpublished.
9. Badran, M.F., (2001) (Memo on "The effects of the 1996 Telecommunications Act on the Competition in the local telephone Market", Department of Economics, Georgia State University, USA, unpublished.
10. Badran, M.F., (2001) "On the Problem of training in the telecommunications" Department of Economics, Georgia State University, unpublished.
11. Badran, M.F., (2001) "The Transition from controlled to open wireless networks in the United States Telecommunications Market" Department of Economics, Georgia State University., M.A. paper., USA

- Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*
12. Baily; Martin Neil , Lawrence , Robert Z., (2001), "Do We Have a New E-Conomy?" The American Economic Review, Vol. 91, No. 2, Papers and Proceedings of the Hundred Thirteenth Annual Meeting of the American Economic Association. (May, 2001), pp. 308-312.
 13. Baranes, E., Gassot, Y. ,(2002), "Will broadband lead to a more competitive access market?", Communications and Strategies, n°46, 2002.
 14. Bauer, J., (2005), Unbundling Policy in the United States Players, Outcomes and Effects, Communications & Stratégies, n°57
 15. Bauer, J.M., Gai, P., Kim, J., Muth, T.A., Wildman, S.S., 2003. Broadband uptake in OECD countries. Paper presented at the 31st Research Conference on Communication, Information and Internet Policy, Arlington, VA, USA
 16. Baumol, W.J. J. Panzar, and R.D. Willig (1982), "*Contestable Markets and the Theory of industry structure*", New York, Harcourt Brace Javanovich.
 17. Baumol, William J. and Sidak ;J.Greory (1994) "*Towards Competition in Local Telephony*", MIT press and AEI Press.
 18. Baumol, W. , (1977), " On the Proper Costs tests for natural monopoly in a multiproduct industry". American Economic Review, Vol.67.
 19. Borenstein, Severin; Saloner; Garth (2001), " Economics and Electronic Commerce" The Journal of Economic Perspectives, Vol. 15, No. 1. (Winter, 2001), pp. 3-12.
 20. Bourrau & Dogan, Pinar, (2001), Regulation and Innovation in the Telecommunications Industry, Telecommunications Policy , Vol.25,pp 167-184
 21. Bourreau and Dogan, P, (2002), Build or buy strategies in local markets, mimeo.
 22. Broner, F., Sergio G., Schmukler, L. (2007), "Why do emerging economies borrow short term?", World Bank paper WPS 3389
 23. Brynjolfsson, E., Hitt, L. M. and Yang, S. (2002) "Intangible Assets: Computers and Organizational Capital," Brookings Papers on Economic Activity: Macroeconomics (1): 137-199
 24. Buigues, P. (2001), " European Policy on Local Loop Unbundling, Competition Law Landscape and Implementation Issues", Communications & Strategies, no.42, 2nd quarter 2001.
 25. Buigues, V. (2001), " European policy on local loop unbundling competition law background and problems of implementation" Communications and strategies n° 42 - 2nd quarter 2001 and EURO CPR Conference 2001.

- Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*
26. Carlton, D. and J. Perloff (2000) , “*Modern Industrial Organization*”, Fourth Edition, Addison-Wesley.
 27. CPB Netherlands Bureau for Economic Policy Analysis, (2005),“Do market failures hamper the perspectives of broadband?”,
 28. Crandall, R. (2004) “*Competition and chaos: The US telecommunications sector since 1996*” Washington DC, Brookings Press 2004.
 29. Deutsche Bank , (2005), “Digital economy and structural change”, August 30, 2005, No. 54
 30. Distaso, W., Lupi, P., Manenti, F. (2006) Platform Competition and broadband uptake: Theory and Empirical evidence from the European Union., *Information Economics and Policy* 18 (2006)
 31. Doyle, C., (2000) “Local Loop Unbundling and Regulatory Risk”, *Journal of Network Industries*, Netherlands,
 32. Economides, N.,(1996), *The Economics of Networks*, *International Journal of Industrial Organizations* 14,
 33. Edwards, G., Waverman, L. (2006) “The Effects of Public Ownership and Regulatory Independence on Regulatory Outcomes. A Study of Interconnect Rates in EU Telecommunications” *Journal of Regulatory Economics*.
 34. Egypt Ministry of Communications and Information technology and Telecom Egypt (MCIT/TE), March 2004
 35. Eisner, J., Lehman,D. (2001), “Regulatory behavior and competitive entry” presented at the 14th Annual Western Conference Center for Research in Regulated Industries.
 36. Eisner, James, and Lehman, Dale E.(2001), “Regulatory Behavior and Competitive Entry”
 37. El Khowaga, Ola (2002)“ privatization and regulation of telecom sector in Egypt” Paper presented in the conference of development and good judgment, The Center for Asian Studies , Cairo , Egypt.
 38. Ellison, Glenn and Ellison, Sara Fisher,(2005) “Lessons About Markets from the Internet”, *Journal of Economic Perspectives*—Volume 19, Number 2
 39. Ferreruella,I., Alabau-Munoz, A. (2004), Key constraints and drivers for broadband development: a cross national analysis. ITS conference, Berlin, Germany.

- Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*
40. Flamm , Kenneth ;Chaudhuri, Anindya (2005), “ An analysis of the determinants of broadband access” Presented at the Telecommunications Policy Research Conference Washington, DC
 41. Ford, G., Spiwak, L. (2004), The positive effects of unbundling on broadband deployment, Phoenix Center for Public Studies
 42. Fraumeni , Barbara M.(2001),“ E-Commerce: Measurement and Measurement Issues” American Economic Review.
 43. Galal, Ahmed ,(1997), “ Telecom Egypt, Status and Prospects” The Egyptian Center for Economic Studies, WP 23
 44. Galal, Ahmed and Nauriyal (1995), “ Regulation of Telecom in Developing Countries: Outcomes, Incentives and Commitment” WP 9513, ERF Working Paper Series, Economic Research Forum ERF for the Arab Countries, Iran and Turkey , Cairo.
 45. Galal, Ahmed, (1998),“Towards More Efficient Telecommunication Services in Egypt” Policy View Point, The Egyptian Center for Economic Studies.
 46. Gans, Joshua S.and King, Stephen P. (2004)“Comparing Alternative Approaches to Calculating Long-Run Incremental Cost”, Melbourne Business School, University of Melbourne, Australia.
 47. García-Murillo, Martha, and Gabel , David, (2003), “International Broadband Deployment: The Impact of Unbundling” paper presented at the 31st Telecommunications Policy Research Conference (Arlington, VA),
 48. Gillett, S., and Lehr, W. (1999) “Availability of Broadband Internet Access: Empirical Evidence,” Paper presented at 27th Telecommunications Policy Research Conference, Alexandria, VA.
 49. Goolsbee, A., (2002) “*Subsidies, the value of broadband and the importance of fixed costs*”, Broadband Should We Regulate High-Speed Internet Access? Edited by Robert W. Crandall James H. Alleman, AEI Brooking Joint Center for Regulatory Studies,Washington, D.C.
 50. Greene, W. H. (2003) “ *Econometric Analysis*”. 5th ed. Upper Saddle River: Prentice Hall
 51. Grzybowski, Lukasz,(2006), “ The Impact of Regulation on the Retail Prices in Fixed-Line Telephony across the European Union” revised November, Munich Graduate School of Economics., Germany.
 52. Guthrie, Graeme, (2006), “Regulating Infrastructure: The Impact on Risk and Investment” Journal of Economic Literature, June 2006.

- Badran* *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*
53. Hatem, Tarek (2005), “Best Practices and Innovation in Governance and Public Administration: The Case of Telecom Egypt” , The American University in Cairo, Egypt, 2005.
 54. Hausman,J&Sidak,G (2004), “Did mandatory unbundling achieve its purpose”, Empirical evidence from 5 countries”, MIT , USA
 55. Hausman; Jerry A.; Sidak ,J. Gregory; Singer, Hal J., (2001), “Cable Modems and DSL: Broadband Internet Access for Residential Customers” The American Economic Review, Vol. 91, No. 2, Papers and Proceedings of the Hundred Thirteenth Annual Meeting of the American Economic Association. (May, 2001),
 56. Höffler, F., (2005), “Cost and Benefits from Infrastructure Competition. Estimating Welfare Effects from Broadband Access Competition” Max Planck Institute for Research on Collective Goods, Bonn.
 57. Hogendorn, Christiaan (2006),“Broadband Internet: Net Neutrality versus Open Access” Economics Department, Wesleyan University, CT, USA.
 58. Howell, B.and Obren, M.,(2002), “Broadband Diffusion: Lags from Vintage Capital, Learning by Doing”, Information Barriers and Network Effects,
 59. Infocom Technology Inc., (2004), “ Egypt Telecommunications Master Plan II Volume 1, Broadband Strategy for Egypt” , USAID Mission to Egypt,
 60. International Telecommunications Union , (2006), “E –Strategies, Empowering Development”
 61. Intven, H (ed) (2000) “Telecommunication Regulation Handbook 2000, World Bank, Washington, module 5”Competition Policy”, Telecom Handbook
 62. Intven, H (ed) (2000) “Telecommunication Regulation Handbook 2000, World Bank, Washington, module 3.
 63. Intven, H (ed) (2000) “Telecommunication Regulation Handbook 2000, World Bank, Washington, module 3 and appendices.
 64. Itida report, (2006), “Information and Communication for Development Global Trends and Policies World Bank 2006”
 65. ITU, (2003) Interconnection Report, 2003
 66. ITU, (2006) World Information Society Report 2006,
 67. ITU, (2006) , Telecommunication Indicators Handbook.

- Badran* *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*
68. ITU, (2006), “Trends in Telecommunication Reform 2006” Regulating in the broadband world”, ITU publications
 69. ITU, (2005) “Core ICT Indicators, Partnership on Measuring ICT for Development”
 70. ITU, (2006) “E-strategies, empowering development”
 71. ITU, (2000 – 2001) “Trends in Telecommunication Reform Report”
 72. ITU, (2006), “Internet Report, Digital life”
 73. ITU, (2007), “Connect Africa, the countdown to 2015”, volume 1, October.
 74. ITU (2008) “ Trends in Telecommunications Reform Report”
 75. Jorde, T.M., Sidak, J.g. and D.J. Teece (2000), Innovation, Investment, and Unbundling , Yale Journal on Regulation , Vol.17,
 76. Joskwo, P.L., (2005), Regulation of Natural Monopolies, Center for Energy and Environmental Policy Research, MIT, WP 05-008.
 77. Kahn, A.E., Tardiff, T.J., and Weisman, D.L., (1999), The Telecommunications Act at three years: an economic evaluation of its implementation by the Federal Communications Commission Information Economics and Policy, Vol. 11
 78. Kedzie, C. (1997), "Communication and Democracy: Coincident Revolutions and the Emergent Dictator's Dilemma", RGSD-127, RAND Corporation, Santa Monica CA.
 79. Kenneth Flamm , Anindya Chaudhuri, (2005), “AN ANALYSIS OF THE DETERMINANTS OF BROADBAND ACCESS”, presented at the Telecommunications Policy - Research Conference Washington, DC, September 24, 2005
 80. Kolko, J.(2007) “Why Should Governments Support Broadband Adoption? Working Paper No. 2007.01, Public Policy Institute of California
 81. Laperrrouza, Marc ,(2006), China’s Telecommunication Policy Making in the Context of Trade and Economic Reform, Thesis submitted for the Degree of Doctorate of Philosophy,
 82. Lehr, W. Osorio, C., Gillett, S., Sirbu M.(2006) “ Measuring broadband’s economic impact” Massachusetts Institute of Technology Engineering Systems Division, Working Paper Series ESD-WP-2006-02
 83. Lehr, W., Biglow, J., Levinson, S. (2002) “ Stimulating investment and the Telecommunication Act of 1996.” Paper files by AT&T in FCC Docket 01-338.

- Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*
84. Leibenstein Leibenstein, H., (1966), "Allocative Efficiency and X-Efficiency," *The American Economic Review*
85. Leibenstein, H., (1976), "*Beyond Economic Man*" Cambridge, MA, University Press,
86. Lichtenberg, F. and Lehr, W. (1998), "Computer Use and Productivity Growth in Federal Government Agencies, 1987-92," *Journal of Industrial Economics*, 46(2).
87. Litan. Robert E, and Rivlin . Alice M.,(2001), "Projecting the Economic Impact of the Internet" *The American Economic Review*, Vol. 91, No. 2, Papers and Proceedings of the Hundred Thirteenth Annual Meeting of the American Economic Association.
88. Machiel, V. and. Machiel , M.(2005), CPB Memorandum, CPB Netherlands Bureau for Economic Policy Analysis, Number : 131, December 2005
89. Maria Michalis (2001), Local competition and the role of regulation: The EU debate and Britain's experience, *Telecommunications Policy* 25.
90. Mark J., Arblaster. M, (1998)"Regulatory techniques for addressing interconnection, access, and cross-subsidy in telecommunications" in "[*Infrastructure Regulation and Market Reform: Principles and Practice*](#)", and Mark A. Jamison, eds., Australian Competition and Consumer Commission and the Public Utility Research Center.
91. MCIT website, www.mcit.eg
92. Ministry of Communication and Information Technology, Egypt (2007), "Egypt's Approach to increase Community Access", 6th World Telecommunication/ ICT indicators Meeting, Geneva, 13-15 December 2007.
93. Miralles, Francesc, (2006), "Efficiency of Public Promotions Policies in the Diffusion of Broadband Networks. An Exploratory Analysis." Presented to the 34th Research Conference on Communication, Information, and Internet Policy, Arlington, Virginia, USA.
94. Mosca, M. (2006), "On the origins of the concept of natural monopoly", University of Salento, Italy.
95. Office of Communication, Ofcom,(2005) Local Loop Unbundling: The fully Unbundled Rental Charge Ceiling, consultation Document.
96. Organization For Economic Co-Operation And Development,(2002), "OECD Reviews Of Regulatory Reform Regulatory Reform In UK Regulatory Reform In The Telecommunications Industry."
97. OECD, (2007), " Catching up on broadband. What will it take?", DSTI/ICCP/CISP(2007)8/FINAL

- Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*
98. Oxford Business Group (2007), "Emerging Egypt 2007"
99. Pepall, L, Richard, D., Norman, G, (2001)" *Industrial Organization: Contemporary Theory and Practice*", South Western College Publishing.
100. Richard T. Shin and John S. Ying(1993), Costly Gains to Breaking Up: Leas and Baby Bells, *The Review of Economics and Statistics*, Vol. 75, No.2,
101. Rosen, Harvey S., (2001), "*Public Finance*" Mc Graw Hill Companies.
102. S. Flood, J.E.(edited) (1975) "*Telecommunication networks*", Peter Peregrinus LTD 1975 (first edition), 1997(second edition)
103. Shapiro, C. &Varain,H.(2000) "*Information Rules*" MIT, P, . 173-225.
104. Sharkey, W. W. (1982) *The Theory of Natural Monopoly*, Cambridge: Cambridge University Press.
105. Shelanski, H.(1999) "A comment on competition and controversy in local telecommunications", *Hastings Law Journal*, Vol 50, August 1999.
106. Shin, R., Ying, J., (1992), Unnatural Monopolies in local telephone, *The Rand Journal of Economics*, Vol. 23 No. 2 (Summer, 1992),
107. Sidak, J. Gregory, Singer ,Hal J. (2003), *Interim Pricing of Local Loop Unbundling in Ireland: Epilogue*
108. Spiller, P., Ulset, S. (2003) " Why Local Loop Unbundling Fails?" Haas School of Business Administration, University of California, Berkley, and Norwegian School of Economics and Business Administration.
109. Spulber, D. (1995), " Deregulation Telecommunications" *Yale Journal on Regulation*, New Haven; v.12, no.1,pp 25.
110. Stallings, W.,(1990) "*Local Networks*", third edition, Macmillan Publishing Company, New York, USA,
111. Stigler, G.(1968), "*Barriers to entry , economies of scale, and firm size, the organization of industry*". Homewood, IL: Richard D. Irwin.
112. Sung, N., Gort, M. (2000), Economies of Scale and Natural Monopoly in the U.S. Local Telephone Industry, *The Review of Economics and Statistics*, Vol 82, No.4(Nov.,2000), pp.694-697
113. Sutherland, E. (2006) "Unbundling of local loops: global experience", Link Center, UK.

- Badran *Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries*
114. The World Bank, (2006), “Information and Communications for Development 2006” The International Bank for Reconstruction and Development / The World Bank 2006.
115. Umino,A. (2003) “Developments in local loop unbundling” DSTI/ICCP/TISP(2002)5/FINAL, OECD Working Paper
116. Umino. Atsushi, (2002), “Broadband Infrastructure Deployment. The role of government assistance”, OECD Science and Technology and Industry Working Papers 2002/15.
117. UNCTAD report, “The digital divide report: ICT diffusion index 2005” United Nations New York and Geneva, 2006
118. UNDP (2005) “Human Development Report”, 2005
119. Viscusi, W.K., Vernon, J.M., Harrington, J.E.(2000), “*Economics of Regulation and Antitrust*”, Lexington, MA: D.C. Health and Company.
120. Vogelsang, I. and Mitchell, Bridger M. (1997), Telecommunications Competition , “*The Last Ten Miles*”, MIT press and AEI Press.
121. Vogelsang,I.(2003), “Price Regulation of Access to Telecommunications Networks”, Journal of Economic Literature, Vol. 41, No.3(Sep., 2003).
122. Wallsten, S. (1999) “An Empirical Analysis of Competition, Privatization, and Regulation in Africa and Latin America”
123. Wallsten, S.,(2006),“Broadband and Unbundling Regulations in OECD Countries” , Working Paper 06-16, June 2006, AEI Brooking Joint Center for Regulatory Studies, Washington, D.C.
124. Wallsten, S., (2005) “Broadband penetration, an empirical analysis of state & federal policies,” ,Working Paper 05-12, June 2005, AEI Brooking Joint Center for Regulatory Studies.
125. Wooldridge, J. (2002), “*Econometric Analysis of Cross-Section and Panel Data*”. MIT Press,
126. World Economic Forum , Augusto Lopez –Claros and Klaus Schwab (2005) The Arab World Competitiveness Report 2005.
127. Woroch, G. A., (2002), “*Local Network Competition*”, Handbook of Telecommunications Economics, vol. 1, ed. Cave M., Majumdar S.and Vogelsang I., Elsevier Publishing, 641-716.
128. www.equanto.com/glossary/e.html
129. www.swipartnership.com/media_centre/media_glossary_e.htm

Badran

Competition in Telecom services. A study on unbundling policies of local loop with an empirical study on broadband penetration in Egypt and some emerging countries

130.

www.mop.gov.eg