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Welfare gains from utility reforms in Egyptian telecommunications

Amirah El-Haddad [a, b, *]

[a] German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE), Tulpenfeld 6, D-53113 Bonn, Germany
[b] Department of Economics, Faculty of Economics and Political Science, Cairo University, Gamaa Street, Giza, 12613, Egypt

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ABSTRACT

Utility sector reform spread across the developing world in the 1980s and 1990s. In Egypt, as in many cases, the pace and nature of reform has been challenged by a state-owned national incumbent. However, in the Egyptian telecommunications sector, rapid growth in the cellular market has overtaken the archaic fixed-line system. Hence, the national monopoly provider, Telecom Egypt (TE), has been stripped of its market power as the market diversified. The implemented public sector reform and privatization placed efficiency pressures on TE resulting in improved outcomes for a range of stakeholders, consumers, workers, and the government, including reduced prices, increased access, and improved service quality. This experience offers lessons for policy makers and researchers about liberalization in the face of entrenched state interests. However, there are nuances in the findings relating to market type, that is, fixed-line versus cellular, residential versus non-residential, and national versus international. Despite attempted improvements, direct competition in its retail market has led to deterioration in TE's financial performance, although this has been partially offset by its monopoly supply of an essential input and a degree of protection provided by the regulator sympathetic to TE. The evidence from this case study supports the concept of a staggered introduction of competition. However, protecting inefficient market insiders, be it firms or workers, is always at the expense of potentially more efficient outsiders.

1. Introduction

Institutional reforms have spread across the developing world since the 1980s because of diminished faith in government as a rational and benevolent social planner, and the debt burden imposed by failing public enterprises. Many countries, including Egypt, have undergone significant utility sector reforms since the 1990s.

The literature in this area includes both cross-country studies (e.g. Goldstein, 2003; Boylaud and Nicoletti, 2000; D'Souza and Megginson, 1999; Bortolotti et al., 2000; Fink et al., 2002; Gutiérrez, 2003; Petrazzini and Clark, 1996; Ros, 1999; Wallsten, 2000; Gasmi and Virto, 2010; Rossoto et al., 2005; Kenny et al., 2007; Andrés et al., 2013; Rodine-Hardy, 2013; Mohamad, 2014) and single-country case studies on the evidence on the impact of telecoms reform (Galal et al., 1994; Laffont and N'Guessan, 2002; Plane, 1999; Boles de Boer and Evans, 1996; Azam et al., 2002; Shirley et al., 2002; Tórero et al., 2003; Clarke et al., 2003; Akdemir et al., 2007; Xia, 2012; Abbott and Ma, 2013; Hawthorne et al., 2014). A recent systematic review summarizes the evidence on the effect of Private Sector Participation (PSP) in the public utility sectors of developing countries (Devkar et al., 2013). For Egypt, one country study was written just one year into the reform (Galal, 1999) and a few have looked at network effects in the sector, but not on sector performance (Badran, 2012a, 2012b). This study fills the gap by analyzing more than 15 years of telecoms reform in Egypt.

The Egyptian telecommunications sector has undergone major reform and experienced rapid growth since the 1990s. This experience offers several interesting lessons for policy makers and researchers wishing to understand the dynamics of reform in a protected market with a state-owned incumbent. What is the appropriate pace of market liberalization? Can and should the national incumbent be protected; if so, how and at what cost to consumers? Can the economic benefits of liberalization be disentangled from those of technological developments?

This paper addresses these questions by assessing the institutional market-based reforms initiated in 1997 in Egyptian

* Current address: German Development Institute/Deutsches Institut für Entwicklungspolitik (DIE), Tulpenfeld 6, D-53113 Bonn, Germany.
E-mail addresses: Amirah.El-Haddad@die-gdi.de, amirah.elhaddad@feps.edu.eg.

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telecommunications, which ended forty years of state dominance over the sector. Reforms included (1) regulatory reform to strengthen the framework of accountability for the utility operator, (2) liberalization, (3) privatization (private-sector participation) to insulate the utility from political interference in daily management, and (4) public-sector reform to enhance the utility's managerial and financial autonomy. Autonomy is intended to harden the budget constraint to discipline public firms. If such discipline is not achieved, failing firms are forced to exit the market. Collectively, these reforms should create contestable markets characterized by free entry and exit, exerting competitive pressure to achieve efficiency and thus welfare gains. This is the causal chain expected from reform.

Section 2 describes the institutional setting and the introduced reforms. The resulting market structure and power follows in Section 3. Welfare gains and impact indicators by stakeholder, including the crucial role of the regulator, are presented in Sections 4 and 5. Section 6 concludes.

2. Institutional setting over fifty years

The history of Egyptian telecommunication falls into three periods: private-sector development of the nascent sector until 1957, state monopoly from 1957 to 1997, and gradual reform and liberalization thereafter. I consider here the latter two periods.

The Egyptian telecommunication sector became a state monopoly in 1957 with the establishment of the Telecommunication Organization, which was responsible for providing fixed-line services and setting prices. No provisions stipulating the basis for price setting were made, granting the organization a great deal of unaccountable power. In 1980, the "Arab Republic of Egypt National Telecommunications Organization" (ARENTO) replaced the Telecommunication Organization. Whilst private companies were previously prevented from operating in the market, ARENTO, the new telecommunication authority was entitled to establish private law companies to provide service. Nevertheless, this entitlement (Article 4 of Presidential Decree 153) was never put into practice. Market competition was thus completely absent. And whilst the new law stipulated prices should be set on the basis of accounting costs,[1] ARENTO determined these costs, again giving the agency (and so government) full discretion over prices.

2.1. Telecommunication reform (1998–2010)

After forty years of monopoly and state dominance, 1998 marked the onset of telecommunications sector reform. Two major factors triggered the reform: (1) reversal of the state-led development strategy of the 1950s and 1960s through the adoption of the Economic Reform and Structural Adjustment Program (ERSAP) in 1991; and (2) the agreements Egypt has entered into following its accession to the World Trade Organization in 1995. The Basic Telecommunications Agreement (BTA), ratified in 2002, provides a framework for the integration of the country's ICT industry into the global economy, committing government to the dismantling of state monopoly in telecommunication (Hassanin, 2007; Badawy, 2007). As in many other developing countries (Azam et al., 2002; Gillwald, 2005; Lee, 2001), four main types[2] of reform measures were introduced: (1) regulatory reform, (2) public-sector reform, (3) market liberalization, and (4) private-sector participation.

2.1.1. Regulatory reform (1998 and 2003)

Prior to reforms public utilities were self-regulating. The lack of accountability resulted in poor performance. Regulatory reform set a legal framework of accountability for the utility operator. First, in 1998 an independent regulatory body, the Telecommunications Regulatory Authority (TRA) was founded to separate regulatory activities from economic ones so as to allow a link between cost and prices.[3] By creating an independent overseer, the reform entailed institutional separation of the regulatory function from *both* the utility and the state. Second, in 2003, the new Telecommunication Regulation Law (Law No. 10, 2003) renamed TRA the National Telecommunications Regulatory Authority (NTRA), and expanded the regulatory body's scope, independence, and power. [4] Although carrying out essentially the same tasks as TRA, NTRA differs in one significant way. NTRA doesn't have the same power over price-setting, thus allowing market players to compete in prices as well as quality. Applicants for licenses are obliged to determine how their prices will be set.[5] Thus, by granting the license NTRA implicitly approves prices. For "basic" services NTRA is entitled to set prices although considering the recommendations submitted by the applicant.[6,7]

2.1.2. Public-sector reform (1998)

State provision for utility services politicized this process resulting in artificially depressed prices, over-employment, manipulation of investment priorities (Galal, 1999; Yehia, 2015), in addition to a lack of managerial autonomy or technical competence (Nagarajan, 2013). Public-sector reform aims to enhance utilities' managerial and financial autonomy relative to the state. A number of measures could be applied to achieve this goal, including the incorporation of the utility or changes in the legal status of the enterprise. Thus, in 1998, ARENTO was transformed into a private law company, Telecom Egypt (Law no. 19), which until 2005 remained fully owned by the state. As a result, Telecom Egypt, now a private sector entity subject to the companies' law, no longer enjoys the privileges and status of a public authority in terms of

[1] Article 12, Presidential decree 153, 1980.

[2] Different literature adopts differing types of reform, for example Samarajiva (2000) and Çetin (2014) adopt a three component reform process. The generic discussion of reform categories in this section draws heavily on Foster et al., 2005.

[3] TRA's responsibilities include: administrating the telecom sector by developing and expanding different types of telecommunications, protecting state sovereignty, ensuring distribution and provision of services in all parts of the country (i.e., rural and urban), granting licenses, setting prices according to cost (Article 1, Presidential decree 101, 1998).

[4] With the complexity of telecommunication services NTRA is now entitled by law (no. 10 of 2003), to issue licenses to companies to provide various telecommunication services (NTRA, 2009).

- Fixed services (fixed telephony, pay phones, prepaid cards).
- International services (international gateway, international submarine cable).
- Data services (class A, B, C, global peering). Peering is a voluntary interconnection of administratively separate internet networks for the purpose of exchanging traffic between the customers of each network. Further explanations are available at: Wikipedia Encyclopedia, 2010a.
- Mobile (2G & 2.5G, 3G & 3.5G, Wireless trunk).
- Satellite services (Nilesat, VSAT, GMPCS (Global Mobile Personal Communications by Satellite)).
- Telecommunications infrastructure leasing. Leasing is a process by which a firm can obtain the use of a certain fixed asset for which it must pay a series of contractual, periodic, tax deductible payments. Further explanations are available at: Wikipedia Encyclopedia, 2010b.
- Telecommunications services on navigation lines.

[5] Article 25, law 10, 2003.

[6] Article 26, law 10, 2003.

[7] Generally, the new Telecommunication Regulation law rests on four main pillars: information disclosure, free competition, the provision of universal services and user protection.

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funding or employment.[8]

2.1.3. Market liberalization (1998, 2003, and 2007)

Most utility services have been provided under legal or actual monopolies. Nonetheless, there has been growing recognition that in some subsectors, such as electricity generation and long-distance calling services,[9] competition is both feasible and desirable. This is in contrast to subsectors with naturally monopolistic infrastructure networks, such as water and electricity distribution. Thus, reforms gradually lifting legal monopoly restrictions, allowing competition to emerge, and creating a broader antitrust framework for the economy have been implemented.

First, is the explicit stipulation in the 1998 law that TRA's responsibilities include the encouragement of investment on a non-monopolistic basis; and the support of free competition amongst foreign and national companies.[10] The new Telecommunication Regulation Law in 2003 reinforced novel concepts such as competition, prohibition of monopolistic practices, trust building between incumbent companies and new entrants to the telecom sector; and the gradual removal of barriers to entry.[11] Enforcement of the law was entrusted to NTRA, which has authority to punish monopolistic practices through denying licensure.

The second event marking liberalization was TRA's granting of cellular service licenses to Mobinil and Vodafone in 1998, introducing competition to the sector (MCIT, 2010). Unlike the fixed-line telephone service, no monopoly status was granted to either company. In effect, the two companies stand to compete with the fixed-line incumbent, Telecom Egypt.[12] After a 10-year duopoly transition period a third cellular operator, Etisalat Masr,[13] entered the market in 2007 guaranteeing further liberalization of the cellular market in Egypt.

2.1.4. Private sector participation (2005)

Private-sector participation (PSP) is one of the deepest reforms affecting public utilities. It is the reform providing the greatest insulation from political interference in the daily management of utilities. PSP extends over a spectrum of contractual forms depending on the scope of responsibilities transferred from the public to the private sector. At one end of the spectrum these may involve subcontracting specific operational functions, while at the other extreme they may involve full transfer of asset ownership (i.e., full privatization). The government embarked on privatizing Telecom Egypt (ARENTO's successor) in 2005 through a first initial public stock offering (IPO). Twenty percent of the company was sold to the public at a value of LE 5 billion.[14]

In summary, after forty years of monopoly and state dominance, reforms were adopted to enhance accountability, financial and managerial autonomy, and the technical competence of the utility operator whilst gradually liberalizing and creating competition in the sector. These reforms created new institutions (i.e., TRA) and regulations (i.e., the 1998 law) and adjusted older ones (i.e., creation of NTRA and, critically, the 2003 Telecommunication Regulation Law), altered old public organizational and ownership structures (i.e., turning the public authority ARENTO into Telecom Egypt, a private law company and subsequently privatizing 20% of the company). Regulatory reforms prepared for liberalization to unleash market forces so that competitive pressures in the liberalized segments of the market would reduce prices. Public-sector reform also aimed to improve the utilities' managerial and financial autonomy, paving the way for private-sector participation (PSP). Liberalization allows free entry into the market and privatization (or PSP) allows free exit (Parker and Kirkpatrick, 2005). Free entry and exit are the poles for contestability in which efficiency motives prevail. Total surplus is enhanced and substantial welfare gains are accumulated, thus completing the causal chain intended by reform.[15] The impact of these profound institutional changes is the subject of the remainder of this paper.

Fig. 1. Three distinct voice markets.
Source: Author's Design

3. Voice market structure, concentration and market power

The market for this study is identified by product and geographical area, which is how markets are defined under Egyptian Competition Law. Accordingly, the voice market includes the fixed-line market, the cellular market, and the combination of the two into the overall voice market (Fig. 1). That is, the voice market is partially segmented into its fixed-line and cellular component parts. The overall market can be further divided into national and international voice. The fixed-line market, a legal monopoly until 2005 and a *defacto* monopoly to date, witnessed no change. Thus, the following discusses the evolution of market structure, concentration, and power for the latter two, namely the cellular and the combined overall voice markets.

3.1. The overall voice market: fixed and cellular services

3.1.1. The national voice market

The National Voice Market covers local (i.e., within governorates) and national long distance (i.e., between governorates) services. Detailed information on traffic (i.e., minutes) for each of these services for all providers would allow for a rigorous analysis, but these data could not be obtained. Numbers of subscribers are thus used as a proxy in most cases.

3.1.1.1. Market structure. Market structure captures how an industry/market's production of output is allocated across different firms. Liberalization of the sector has added three more players to a market that was for many years a legal monopoly. Egypt's commitments under the WTO allowed TE exclusive rights for the provision of fixed-

[8] Article 2.
[9] Called "mohafazat" calls in Arabic.
[10] Article 1, Presidential decree 101, 1998.
[11] Articles 2, 24 and 25, law 10, 2003.
[12] So competition here takes place through the introduction of cellular operators not additional fixed-line ones.
[13] The process had been competitive with NTRA launching a bid in 2006, and receiving applications from 11 consortiums. A consortium led by Etisalat of Emirates, which includes Egypt Post, National Bank of Egypt and Commercial International Bank.
[14] The sale of a second tranche of Telecom Egypt shares and a second national fixed-line license were postponed in the wake of the global financial crisis – so it was claimed. Instead, two regionally limited triple play licenses for fixed-line voice, high-speed broadband and pay TV services were tendered in 2010 (Lange, 2010).
[15] For a precise definition of the causal chain concept see (White, 2009).

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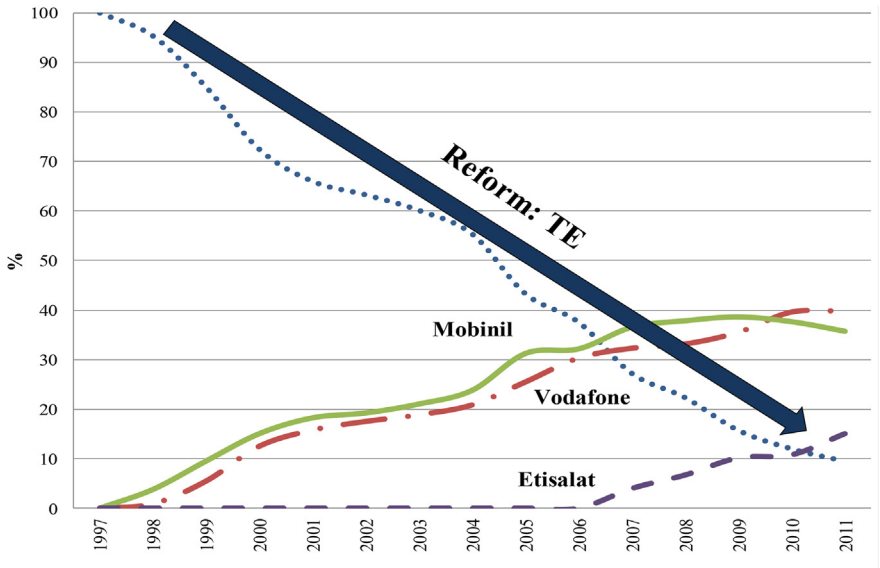

Fig. 2. Evolution of 4 player subscriber market share (1997–2011).
Source: Author's calculations from MCIT Database 2012

line telephone and other services until 2005[16] (WTO, 2010), but permitted cellular competition. As a result the overall voice market has moved from a monopolistic structure to an oligopolistic one.[17]

3.1.1.2. Market concentration. Increased competition in the national market appears to have led to significantly lower concentration levels (Annex 2 Table 6), appearing to bring the market closer to the competitive ideal. The HHI has dropped from its extreme value of 1 in the years up to and including 1997, when TE was the only firm in the market, to less than half that value (0.49) only 4 years later, and to just under one third (0.32) by 2011.[18,19] Market share of the fixed-line incumbent has dramatically and steadily declined from a 100% before 1998 to just 9% in 2011, as other players claimed growing market shares (Fig. 2, Annex 2 Table 6). These competitive pressures are also demonstrated by the striking decline in fixed-line usage since the reforms, driven by increasing penetration of cellular services. In 2009 households spent an average LE 76 a month on cellular bills but only a little more than half that amount (LE 44) on their fixed-line bill (calculated from MCIT Database, 2010). Indeed, by 2009 cellular traffic surpassed that of fixed-line (with the latter capturing 90,785 and the former 120,830 million minutes respectively).

After the most striking jump in 1998[20] fixed-line call volume has fallen by more than half since the start of the reforms, from just over 200 billion minutes in 1998 to about 88 billion in 2010 (Fig. 3).

After ten years, TE fell from number one to number three in 2007 (Annex 2 Table 6), with a share of just 27%, handing the top position to Mobinil. Mobinil's share kept rising steadily, moving to first position in 2007, but falling into second place behind Vodafone three years later. The continuous fluctuation in market players' shares reflects the dynamism of the sector (Fig. 2; Annex 2 Table 6).

3.1.2. The international voice market

3.1.2.1. Market structure. Prior to 1998, TE was the only international voice service provider. From this year its legal monopoly status in direct provision was terminated, however, under the WTO commitments Telecom Egypt was given exclusive rights to provide cross-border transmission until 2005[21] (WTO, 2010).[22] So any provider providing or receiving international call services (or internet) had to "rent" TE's international gateway and network.[23]

This exclusivity in provision has implications for the competitiveness of the international voice (and internet) markets. Despite the presence of other international voice service competitors since 2004,[24] this competition is muted by the monopolistic status of their upstream supplier (TE). In other words, instead of monopolizing direct provision of international voice services, TE now monopolizes their indirect provision, thus creating an additional link in the vertical chain of operation between cellular companies and the final consumer. This situation is also known as Monopoly Supply of an Essential Input,[25] characterized by an upstream monopoly "bottleneck". The state monopoly owns the network that rival suppliers must access, but the downstream market remains competitive (Fig. 4).

[16] Precisely until 31/12/2005.

[17] Oligopolistic markets are imperfectly competitive markets characterized by only a few players, in which strategic interdependence is typically a key feature. Strategic interdependence is how a firm acts depends on expectation about other firms' actions.

[18] Concentration measures, such as the Herfindahl-Hirschman Index (HHI) or the Concentration Ratio (CR_n), summarize market structure in one number, ranging from close to zero for perfect competition to one in the case of a monopoly.

[19] Concentration ratios (CR1 and CR2) confirm the same trend. For instance, from a CR1 value of 100% in 1997 reflecting that TE held the whole market, this ratio fell to its lowest 37% in 2007. This figure means that the largest firm in the market (Mobinil in that year, not TE) acquired a market share of 37% in terms of numbers of subscribers.

[20] In addition to TE's replacement of ARENTO in 1998 the Ministry of Communications and Information Technology was also founded in the same year to develop the sector's technological infrastructure which is likely to explain the stark jump in call duration in 1998 (Law 19/1998).

[21] Precisely until 31/12/2005.

[22] Despite the termination of the exclusivity period some years ago now, no provider applied for an international gateway license for the first four years, Etisalat doing so in 2009. Which NTRA granted for a sum of LE 300 million.

[23] This is also true of national and international calling card companies.

[24] Mobinil, Vodafone, Telecard and Ahlia. Marhaba and Marhaba Plus cards are a product of TE. Later in 2007 Al Arabia Communications and Etisalat Misr have joined this market.

[25] Two conditions should be satisfied for the input to be labeled essential or bottleneck good: (1) there has to be no viable substitutes, and (2) downstream firms could not produce it at the same cost in a short time span. (Pepall et al., 2005).

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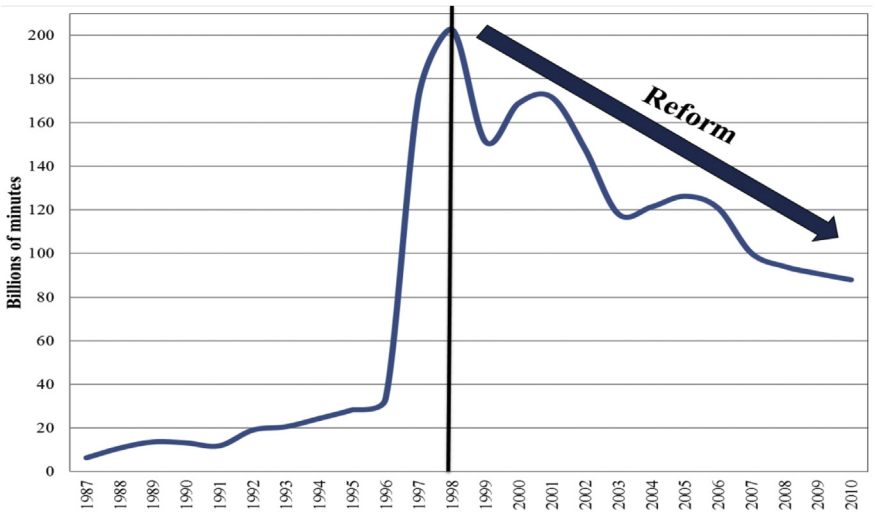

Fig. 3. National Fixed-line Traffic (1987–2010). Note: National fixed minutes or fixed-line call volume here refer to local (i.e., within governorate) and national long distance (i.e., between governorates) traffic for fixed-lines).
Source: Data for 2007 and 2008: MCIT, 2011; 1987–2006 and 2009–2010 calculated based on the data trend of Euromonitor International (2010). Euromonitor International database 2010 included national fixed minutes 1997 2009, called here Series (1). Early 2011 this data series was removed by Euromonitor and replaced by a different series covering the years 1998–2010 only, called here Series (2). Series (1) and (2) differ more than twenty fold compared to the two data points for the years 2007-08 obtained from MCIT, but one being much higher and the other much smaller (so in opposite directions). Series (1) is more than 20 times greater than MCIT data, and series (2) is a mere twentieth of the figures reported by MCIT. Nevertheless, the overall trend of the two series appears sensible and are more or less identical. Hence, series (1) trend was used to extrapolate the rest of the years.

3.1.2.2. Foreclosure of competition: margin squeeze. Since TE charges cellular providers for using its network for outgoing international calls,[26] this structure induces foreclosure of competition in the form of margin squeeze, whereby the vertically integrated firm (TE) squeezes the margin available to downstream competitors by charging them a high wholesale price for its service but sets a relatively low retail price at which its downstream arm supplies final consumers. The literature also confirms that the incumbent, which enjoys a vertically integrated structure, first mover advantage, and closeness to government - is likely to abuse the exclusivity period to protect its interests by creating hurdles for actual and potential competitors, relating to connection and interconnection charges (cf. Makhaya and Roberts, 2003; Devkar et al., 2013). Indeed, industry insiders confirm preferential interconnection charges to Vodafone (Interview material, April 2010a; Alaa El-Din, 2016).

TE has a 45% stake in Vodafone, so the company is not on a level playing field with the other non-TE international call providers. TE signed a commercial deal with Vodafone in 2009 with a package that included favorable network rental terms compared to the other providers (Interview material, April 2010a). However, according to NTRA officials, the authority is unaware of details of this agreement, reflecting badly on the regulator's effective oversight of the market. However, since these charges vary by provider, this practice would act as a barrier to entry.[27]

In 2009 Vodafone captured the largest share of the international voice market (51%, Table 1). Vodafone links with TE, together with its business strategy, have apparently reinforced the company's increased international market share. Since all three providers remain in the market, they may be jointly charging a higher price than would prevail under fully competitive conditions. Vodafone is likely making super normal profits and the others are able to cover their higher costs induced by the margin squeeze to which they are subjected. This analysis supports the margin-squeeze hypothesis, although it is not conclusive. Rigorous testing of the hypothesis is not possible due to the lack of public data on (rental) prices charged to and received by each supplier, including TE's own downstream arm pre- and post-TE's investment in Vodafone.

The ability of the incumbent to act in such an anti-competitive manner reflects two deficiencies. The first pertains to the way deregulation has been carried out, that is, in the type of PSP employed. Devkar et al.'s (2013) review presents evidence that concessions yield greater positive results than the divestiture approach the Egyptian government took to TE. Divestiture has possibly much greater negative effects because concession contracts often include clauses of termination if some target for performance is not achieved; likewise if dominance is abused. Second, the regulator is sympathetic to TE. NTRA is viewed in part as a "captured"[28] regulator who seems to turn a blind eye to the incumbent's anticompetitive practices. Similarly, NTRA has restricted domestic access to voice-over-internet services (VoiP). Allowing free access to these services would undermine phone-based international calls, jeopardizing TE's revenue from retail and

[26] It also pays them around 6.5 Egyptian piasters per minute for incoming international calls.

[27] If the vertically integrated firm (TE) sets these prices so that the margin is too small for the downstream rivals to cover their costs, then the market encounters a margin squeeze. If the integrated firm squeezes all its downstream customers at once then all downstream firms are forced to charge higher prices (cf. Pepall et al., 2005). But since these firms supply 90% of the international market (Table 1) this squeeze is likely to have led to an increase in market price rather than the exit of these firms. The theory assumes intention to squeeze the market as a strategy to eliminate competition. But in fact TE may be forced to charge higher rentals on account of its high costs.

[28] It is quite common for the regulator to fall into the trap of either "regulatory capture" or "policy capture". Political capture takes place when regulatory goals are altered to serve political ends, e.g. the re-election of the government or in non-democratic countries the pleasing of the government to maintain government positions. Regulatory capture on the other hand is the regulator sympathizing with any of the firms it is regulating, be it the national incumbent in our case, or any of the other cellular providers. Both types of capture are at the expense of consumers and, ultimately, at the expense of overall welfare.

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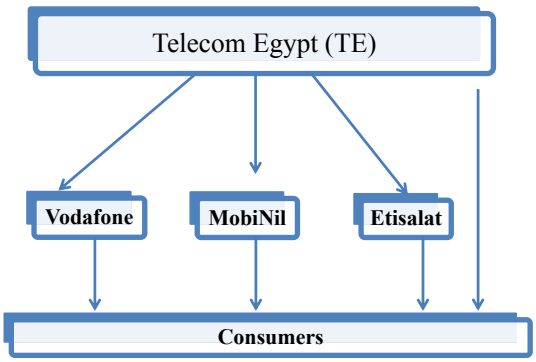

Fig. 4. Monopoly supply of an essential input.
Source: Author's design

wholesale voice activities. Similarly, the regulator has also denied Mobinil a license to an international gateway. Since international wholesale call revenue yields an estimated LE 3,88 million a year, or around 40% of total TE service revenues (of LE 9.9 million in 2011), losing revenues from international gateway leasing would seriously jeopardize the giant 55,000 employee company (El-Haddad and Attia, 2012). The story is slightly different for Etisalat, which acquired its own international gateway license in 2009. Compared to Mobinil, however, Etisalat is for now a minor threat controlling less than 0.5% of international market share (Table 1).

By protecting the incumbent, NTRA shows indications of political capture and little independence from the government. This situation is made worse by the skill composition of the regulatory staff. Engineers make up more than 90% of NTRA's staff and lack the relevant expertise even to serve the government's stated goals. Other regulatory agencies around the world employ economists, lawyers, and other professionals, some with private-sector experience.

By favoring TE, NTRA can maximize government revenue in the short run. Allowing the erection of an international gateway would potentially reduce international call prices, which is more likely to attract call centers from around the world and open up the market for exports. The latter would eventually provide other benefits, such as sorely needed foreign exchange and more taxes from additional consumers[29] who have now entered the market. A visionary, creative, and specialized regulator would recognize such opportunities.[30]

3.1.2.3. Market concentration. Despite the anti-competitive practices mentioned above, benefits have accrued from opening up the international market. Concentration levels in the international voice market have also declined from an extreme value of one in 1997; gradually reaching a HHI of 0.39, CR_1 and CR_2 of 51% (accounted for by Vodafone as a top market player) and 85% respectively by 2009, certainly an improvement to a purely monopolistic situation (Table 2) and affirming the benefits in market structure resulting from competition. Since 2004 however, these indicators have been on the rise. Compared to the domestic voice market, concentration levels are higher,[31] likely on account of the restricted competition characterizing this segment of the overall voice market, favorable Vodafone-TE links and Vodafone's own business and sales strategy. Incomplete contracts during the exclusivity period and the lack of clarity in the licenses over the resolution of various monopolistic practices relating to interconnection charges and capacity, and costs of switching of infrastructure, have prevented the cellular segments of the market from achieving their potential in terms of both coverage and quality (Frempong and Atubra, 2001; Makhaya and Roberts, 2003; Devkar et al., 2013).

Following the reforms, the overall voice market with the four market players (the national incumbent, Telecom Egypt, and the three cellular providers) has gradually become more competitive and less concentrated. Typically, the less concentrated the market the less market power is enjoyed by its participants. In this sense, TE has lost a great deal of market power, moving from a pure monopolistic status capturing a 100% of the market to a small share of just 9% of overall subscribers by 2011, despite relentless efforts to restrict competition.

3.2. The cellular market and the staggered entry model: scope for active competition policy

3.2.1. Market structure and concentration

Egypt's WTO commitments granted the two cellular operators, Mobinil and Vodafone, exclusive rights to the end of 2002,[32] but new entrants were further sequenced or staggered and Etisalat did not enter the market until 2007. Shifting market shares in total subscriptions in the cellular market shows the dynamic nature of this market is (Table 2). Following Etisalat's entry its share remained modest (17%), but price competition prompted market growth making it easier for a new entrant to claim market share. Staggered entry, as applied in Japan and South Korea, permits entry of one or very few firms at a time, thus achieving economies of scale[33] and sufficient market power to be profitable (cf. Amsden, 2001; Edwards, 1992; Haggard, 1990; El-Haddad, 2010). When considered appropriate, additional entry is introduced to induce further competition. Such active industrial policy comes at a short-term loss from reduced consumer surplus compared to the surplus that would have otherwise accrued to consumers had competition been more aggressive.

In brief, the cellular market remained a duopoly[34] for nearly ten years until competition introduced in 2007 transformed it into an oligopolistic structure.

The exclusivity period for the fixed-line incumbent should provide an investment incentive as it guarantees the operator faster returns on the capital invested (Devkar et al., 2013). Additionally, the presence of a regulator during the reform process should in principle create pressure for the incumbent to invest to avoid sharp declines in profit once markets are liberalized (Harnischfeger, 2003). But with a sympathetic regulator who would extend a soft-budget constraint,[35] TE never really felt the pressure to

[29] Now thought of as potential "consumer" entrants.

[30] For a detailed discussion on post-reform regulation in Egypt see (El-Haddad, 2015).

[31] For the domestic voice market concentration indices are calculated based on numbers of subscribers but here they are calculated based on minutes. Minutes are not available for the domestic call market.

[32] Precisely up to 30/11/2002.

[33] Economies of scale are present whenever the unit cost of a product decreases the more is produced of that product (in total).

[34] A duopoly is a special case of oligopolistic markets with just two players in the market.

[35] Softening of the budget constraint occurs when the strict relationship between expenditure and earnings has been relaxed because excess of expenditure over earnings will be paid by some other institution, typically the state. A further condition of softening is that the decision maker expects such external financial assistance with high probability, and this probability is built firmly into his behavior" Kornai, 1986. Kornai, the first to use this terminology, argues that there are different ways to soften the budget constraint of the firm: through 1) soft subsidies, 2) soft taxation, 3) soft credit and; 4) soft administrative prices (Kornai, 1986). For a literature review on soft budget constraints see Maskin (1999).

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Table 1
Evolution of International Market Shares and Concentration Levels. (Overall market, in thousands of outgoing minutes, share in %, 1997; 2003–2009).

	Telecom Egypt Menatel - Nile Communications	Mobinil	Vodafone	Etisalat	Other	Total Minutes	Concentration Indices		
							HHI	CR1	CR2
1997	N/A	0	0	0	0		1	100%	
	100%	0	0	0	0	0			
Oct-Dec 2003	26,222	25,614	22,340	0	11,563	85,740	0.27	31%	60%
	31%	30%	26%	0%	13%	100%			
2004	108,538	129,420	110,479	0	49,036	397,474	0.27	33%	60%
	27%	33%	28%	0%	12%	100%			
2005	108,320	140,344	141,647	0	54,475	444,786	0.28	32%	63%
	24%	32%	32%	0%	12%	100%			
2006	100,550	156,796	186,053	0	53,570	496,970	0.29	37%	69%
	20%	32%	37%	0%	11%	100%			
2007	87,305	192,755	251,260	981	44,415	576,715	0.33	44%	77%
	15%	33%	44%	0.17%	8%	100%			
2008	78,064	200,213	286,875	82	34,005	599,239	0.36	48%	81%
	13%	33%	48%	0.01%	6%	100%			
Jan- Aug2009	44,303	120,566	187,223	102	11,946	364,139	0.39	51%	85%
	12%	33%	51%	0.03%	3%	100%			

Note: *Concentration Ratio (CR_n) is the market share of the top n firms in the industry; here we calculate the share of the top firm (CR_1) and the top two firms (CR_2) in the market.
*The Herfindahl-Hirschman Index (HHI) is calculated as the sum of squares of market shares.
$HHI = \sum_{i=1}^{N} S_i^2$, where.
1) i is the ith firm of the industry where i = 1 … N.
2) N=# of firms in the industry.
3) Extreme cases: in perfect competition HHI = 0, in pure monopoly HHI = 1; and so $0 \leq HH \leq 1$.
Source: Numbers of minutes: MCIT Database, 2010. Market share, HHI, CR1, CR2: Calculated from MCIT Database.

intensely invest knowing that the regulator would not grant a second fixed-line license in the foreseeable future. Average TE investments are less than half those of cellular investments throughout 2001-09[36] (LE1, 877 million compared to LE3, 924 million).

4. Welfare gains: overall sector performance

The previous section showed that reforms resulted in a more competitive, less concentrated, and dynamic market structure. These changes seem to have led to significant improvements in sector performance. The before-and-after analysis[37] provided here is justified by the sharp structural breaks in all reform indicators. The first part briefly shows aggregate indicator improvements while the second part details the welfare gains by stakeholder and type of reform. The next section identifies winners and losers of the reform and gives a detailed account of the impact on the sector's different stakeholders.

Revenues, minutes of usage, and capital investment all witnessed faster growth rates following the reform. Real telecommunication output in Egypt (e.g., revenue at constant prices) started to accelerate in 1998, the increase likely driven by cellular phones (Annex 2 Fig. 17). Cellular share of sector revenue grew from 12% in 1998 to 74% in 2009 (Fig. 5a).

Fixed international outgoing minutes grew rapidly until 2005, from just under 6 million minutes in 1981 to more than 400 million in 2005 (ITU database, 2010) (Annex 2 Fig. 18). On average international minutes increased nearly five-fold since the start of reforms to 2005 (Annex 2 Table 7). Finally, both private and government capital investment have grown hand in hand with the sector. Capital investment in the sector between the pre- and post-reform periods has increased twelve fold (from an average yearly value of 553 LE billion throughout 1980-97 to 6529 LE billion

Table 2
Evolution of Market Shares and Concentration Levels. (Cellular market, subscribers in thousands, share in %, 1998–2011).

	Vodafone	Mobinil	Etisalat	Total Subscribers	Concentration Indices		
					HHI	CR_1	CR_2
1998	37	158	0	195	0.69	81%	100%
	19%	81%	0%	100%			
1999	332	576	0	908	0.54	63%	100%
	37%	63%	0%	100%			
2000	1012	1218	0	2230	0.50	55%	100%
	45%	55%	0%	100%			
2001	1601	1851	0	3452	0.50	54%	100%
	46%	54%	0%	100%			
2002	2143	2352	0	4495	0.50	52%	100%
	48%	52%	0%	100%			
2003	2740	3057	0	5798	0.50	53%	100%
	47%	53%	0%	100%			
2004	3569	4074	0	7643	0.50	53%	100%
	47%	53%	0%	100%			
2005	6125	7505	0	13,630	0.51	55%	100%
	45%	55%	0%	100%			
2006	8734	9267	0	18,001	0.50	51%	100%
	49%	51%	0%	100%			
2007	13,333	15,089	1643	30,065	0.45	50%	95%
	44%	50%	5%	100%			
2008	17,611	20,101	3560	41,272	0.43	49%	91%
	43%	49%	9%	100%			
2009	23,325	25,354	6673	55,352	0.40	46%	88%
	42%	46%	12%	100%			
2010	31,788	30,225	8648	70,661	0.40	45%	88%
	45%	43%	12%	100%			
2011	36,663	32,914	13,849	83,425	0.38	44%	83%
	44%	39%	17%	100%			

Note: same note as in Table 1 above.
Source: Numbers of subscribers: MCIT Database 2012. Market share, HHI, CR_1, CR_2: calculated from MCIT Database.

[36] Those are the only years available. No broken down data available prior to 2001.
[37] Also known as interrupted time series.

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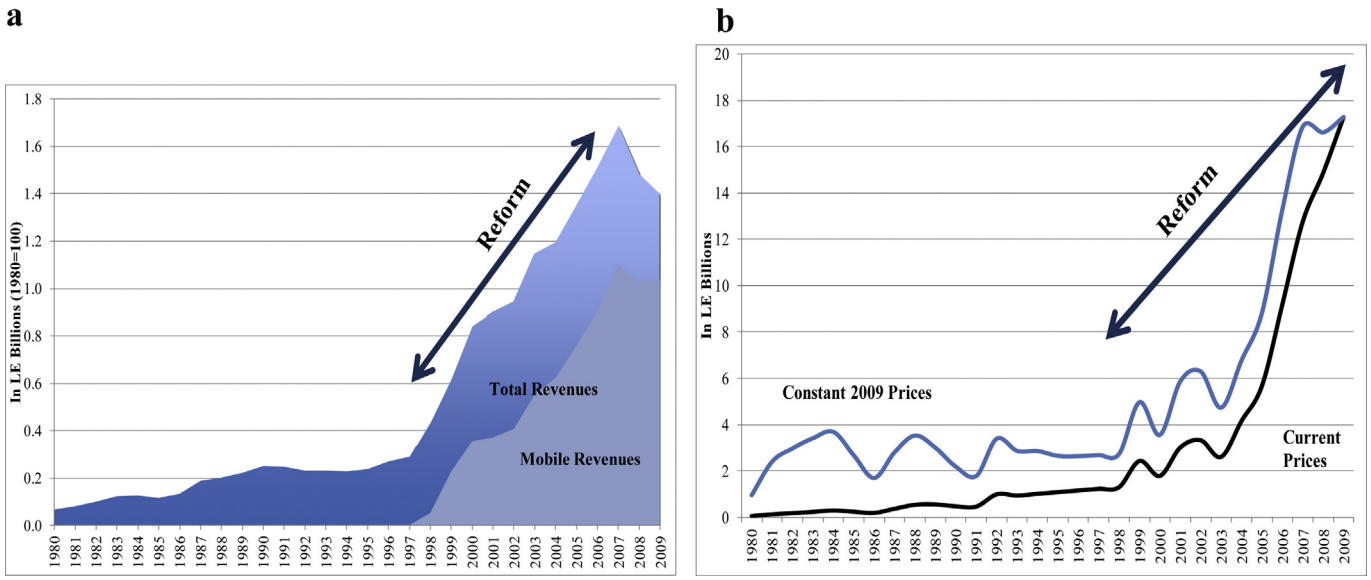

Fig. 5. Overall Sector Performance. a: Share of Cellular Revenues in Telecommunication Revenues (Constant Prices, 1980–2009). b: Capital Investment in Telecommunication (1980–2009).
Source (a): Euromonitor International, 2010. Revenues converted from nominal to real using CPI from World Development Indicators, World Bank, 2010. (b): ITU Database, 2010; Euromonitor, 2009 (1981, 1995–1998). Capital investment converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.

throughout 1998–2009, Fig. 5b; Annex 2 Table 8); at constant prices, it grew rapidly at a rate of just under 50% post-reform (1998–2009) compared to 10.6% pre-reform (1980-97).[38]

Despite these dramatic improvements, Egypt has lagged behind other Middle East and North Africa (MENA) countries such as Israel and even Morocco. Rossoto et al. (2005) conclude that compared to other (MENA) countries, Egypt has been relatively limited in its degree of market openness on account of several regulatory impediments, as discussed above. Nevertheless, in 2013, Egypt lagged behind just 9 of the 20 MENA countries, with a turning point of becoming above average in cellular penetration in 2011 (122 compared to a MENA average of 114 subscriptions per 100 inhabitants in 2013; WDI Database, 2014).

5. Impact indicators by stakeholder

Foster et al. (2005) identify five main stakeholders for any type of reform: (1) consumers, including potential as well as clandestine, (2) workers, (3) competitors and potential competitors and, (4) owners, and (5) the state. Reforms may affect consumers through changes in price and in the quality of and access to service. They affect workers through changes in the number of employed people, the wages they receive, and productivity. Both incumbent firms and potential market entrants will be affected through changes in profits and likely ease of entry (triggered by changes in cost of entry to the market).[39] Reforms that entail transfers of asset ownership alter the interest and goal of owners. The final stakeholder is the state, which is affected through changes in government financial flows as well as changes in the level of governmental control over an extremely strategic and sensitive sector (Table 3). The state may also care about the impact on different stakeholders for political reasons. The final outcome of utility reform can vary significantly depending on the types of reforms adopted and their implementation (cf. Devkar et al., 2013). There is an expected direction, magnitude, and evolution of impacts for these various types of utility reforms (see Annex 1 for a detailed account).[40]

5.1. Consumers: price, access and quality

5.1.1. Price of service

Reforms have ambiguous impacts on prices. In straightforward cases, when tariffs have been politically suppressed, all reforms except liberalization are likely to increase prices or tariffs toward cost recovery levels. In contrast, when tariffs have been covering costs but production has been inefficient, all types of reform are expected to enhance efficiency and drive tariffs lower, in turn benefiting consumers. Regulatory, public sector, and private-sector participation achieve lower prices through greater efficiency, whereas liberalization achieves price reductions through competitive pressures. Prices in the telecommunication sector have declined by 60% between 2002 and 2011 (Annex 2 Fig. 19), likely reflecting both efficiency and competitive pressures.[41] Yet, on a disaggregated level, the details of the story differ by type of line (fixed versus cellular), by type of consumer (residential versus non-residential) and, most importantly, by type of market in which firms are competing (national or international and thus whether contestable or not).

5.1.1.1. Cellular line tariffs: pre- and post-paid

The cellular market has responded dramatically to the institutional reforms to date. Both per-minute prices and fixed registration charges have dropped markedly. This was especially apparent

[38] The sector's infrastructure was antiquated until the early 1990s. In the mid to late 1970s the telephone system was obsolete and extremely congested, with a telephone line density of one telephone per 100 people. According to a 1994 USAID evaluation, repair attempts were often futile because the equipment was so old that cables disintegrated when touched. The country had not made any investments in modernizing its network for over 10 years. The government has since modernized and upgraded parts of the sector's infrastructure by extending fibre optic connections throughout Egypt, upgrading the copper lines and data centers and by improving the integration of applications (Hassanin, 2007).

[39] For a discussion of entry conditions, see El Haddad, 2015.

[40] For a complete and comprehensive description see Foster et al., 2005.

[41] But also technological improvements.

Table 3
Stakeholders and indicators of reform.

	Employment, Wages and Productivity	Price of Service	Quality of Service	Access to Service	Asset Ownership	Fiscal Flows	Entry Conditions
Consumers							
Current		✓	✓				
Potential		✓	✓	✓			
Clandestine				✓			
Workers	✓						
Competitors							✓
Owners					✓		
State	✓				✓	✓	

Source: Adapted from Foster et al., 2005 p. 93.

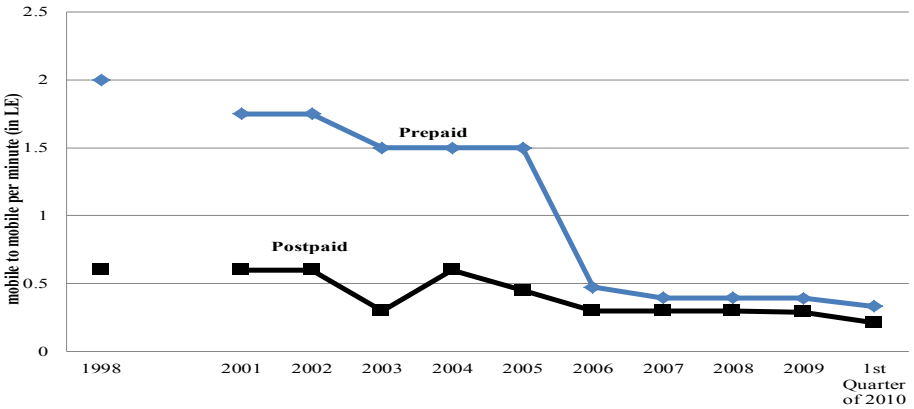

Fig. 6. Price per minute (cellular to cellular, 1998–2010). Notes: Prices are based on the most used cellular package. Starting Jan-March 2010, Vodafone applied the system of Vodafone easy instead of Vodafone one. Data points from 2006 to 1st quarter of 2010 are weighted by the number of subscribers for each of the three cellular companies. Source: prices 1998–2005 are from NTRA, 2010, prices 2006–2010 are from MCIT Database, 2011.

for post-paid cellular services[42] (Fig. 6). But the difference between post and pre-paid lasted only until 2006, one year prior to Etisalat's entry. Since then, the price gap has narrowed as prices continued to decline. In December of 2010, some packages have offered prices as low as 14 piasters a minute. The sharp price fall in 2006 indicates either one of two possibilities of firm behavior: 1) reforms have triggered Bertrand style competition followed by predatory action in 2006, to deter entry of Etisalat (the potential rival); or 2) the two duopolists (Vodafone and Mobinil) had formed a cartel with a price fixing agreement that broke with the relaxation of a collusion facilitator, namely the threat of Etisalat's entry.

5.1.1.2. Fixed-line tariffs: fixed charges versus per minute rates

As indicated earlier, in sectors where prices were kept artificially low, all reforms except liberalization will increase prices to efficient cost-recovery levels. But in sectors where production is inefficient and prices are high to cover excess costs, all reforms will reduce prices. In mixed cases, like Egypt, when tariffs have been kept low and enterprises are inefficient, tariffs would initially increase to cost-recovery levels but then decrease in the middle term because of efficiency improvements and increased competition. This is precisely what happened in Egypt for fixed-line prices of the national incumbent TE (Fig. 7).

(a). Fixed charges: installation charges

For more than three decades fixed installation charges were set relatively high to balance the suppressed, politically-determined per minute tariffs and so partially cover costs.[43] These costs were high due to production inefficiencies, including the obsolete copper-based telecommunications infrastructure. Installation tariffs internalized these inefficiencies. Fixed installation charges stabilized for nearly 10 years post-reform before dropping rapidly in 2006 on account of both efficiency and competitive pressure particularly from Etisalat (Fig. 8a). This drop was associated with a NTRA supported decision. In 2008, installation fees reached LE 87 for residential lines and LE 500 for business, close to their nominal value in 1987. These reductions are even more pronounced in real terms (Annex 2 Fig. 20) and have been effected through limited time offers in selected months of the year.

(b). Fixed charges: monthly subscription

Unlike installation fees, fixed-line fixed monthly subscriptions (as a more current expenditure) were originally suppressed, leading to a continuous increase after the reform (Fig. 8b). In 2002, four years after the reform, monthly subscriptions started to rise reaching LE24 for business and LE12 for residential lines by 2009, though this increase is not very pronounced in real terms (Annex 2 Fig. 21).

(c). Per minute tariffs: fixed-line to fixed versus fixed-line to cellular

For many years, the incumbent fixed-line monopoly, Telecom Egypt, has managed to bear the costs of low suppressed per minute

[42] The security post-pay customers bring has been rewarded by lower per minute rates. In 1998 post-pay customers were paying only a third of the price charged to pre-pay customers; 60 piasters versus LE 2 (=200 piasters). Post paying customers are mostly employees of companies and institutions whose employer signs the mobile contract on their behalf, thus eliminating the adverse selection problem. This is so since their type (i.e. as being "low risk" in other words those who would be paying their bills) is identified with near certainty.

[43] Reflecting a greater degree of commercially-oriented management compared to other public sector sectors.

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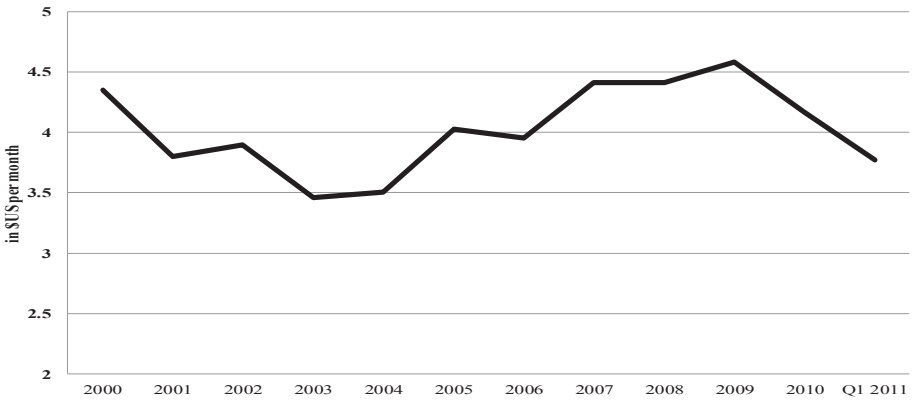

Fig. 7. Price basket for residential fixed-line (2000–2011).
Source: Fixed lines: data for 2000-05, WDI, World Bank (various issues) from International Telecommunication Union (ITU), World Telecommunication Development Report and database, and World Bank estimates, data for 2006-11 ICT indicator portal, MCIT, 2012.

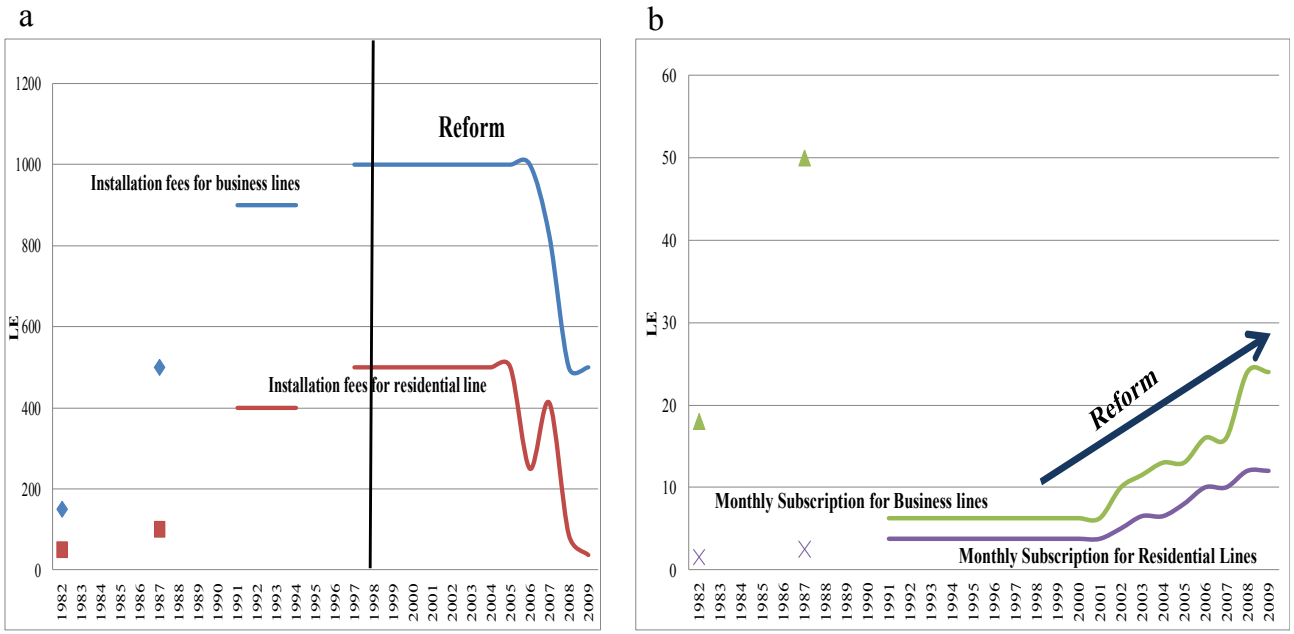

Fig. 8. Fixed-Line Fixed Charges. a: Fixed-Line Fixed Installation Charge by Line Type (1982–2009). b: Fixed-Line Monthly Fixed Subscription Charge by Line Type (1982–2009).
Source: ITU Database, 2010.

prices through cross subsidization. Low charges for domestic fixed-line calls have been cross-subsidized through high national long distance (i.e., between governorates) and international call tariffs. The former were less than 6 piasters (i.e., less than 1 cent) for a 3-min phone call prior to 1995, which is very low by international standards. This rose to 10 piasters in 1998. Following reform, fixed-line (local) call rates increased to reach 14 piaster for a 3-min phone call in 2009[44] (Fig. 9a). This is the expected effect of prices moving toward cost-recovery levels.

The story differs between fixed-line and cellular tariffs. With only one fixed-line provider, raising local tariffs to efficient levels is relatively easy. However, with respect to calls to cellular phones, the market is a different matter because of direct competition. As a result fixed-line per minute charges to cellular phones have dropped from about 50 piasters to 30 piasters within just two years (from 2006 to 08); and in 2008 peak prices have caught up with off-peak prices (Fig. 9b). Real prices mirror these trends (Annex 2 Fig. 23).

In recent years, TE has introduced bundled offers and discounts; these reflect the positive impact of reform on pricing strategies. Bundles and discounts are examples of second-degree price discrimination,[45] which can lead to an expansion in total output by attracting customers with lower willingness to pay. In cases where

[44] In real terms this price increase is muted due to inflation (Annex2 Fig. 22). On the other hand, international call prices have decreased in both nominal and real terms (not shown). These price changes were determined by Telecom Egypt and supported by NTRA administration. Article 30 in the licenses section of the new Telecommunication regulation law (10 of 2003) explicitly prohibits cross subsidization, but these rules do not apply to Telecom Egypt during its allowed period of transition. A separate part of the law (part 5) is tailored for Telecom Egypt. Yet, since the liberalization of international call tariffs since 2006 (Since the partial privatization of TE in 2005 through a first IPO TE prices are no longer set by the government rather are set by the company in consultation with NTRA) and the competition the company faces from cellular providers and internet based calls Telecom Egypt's international call prices have followed a downward trend, falling by an estimated 70 percent.

[45] Second degree price discrimination occurs when a supplier offers a range of deals to all customers allowing different customers to self-select into their preferred deal.

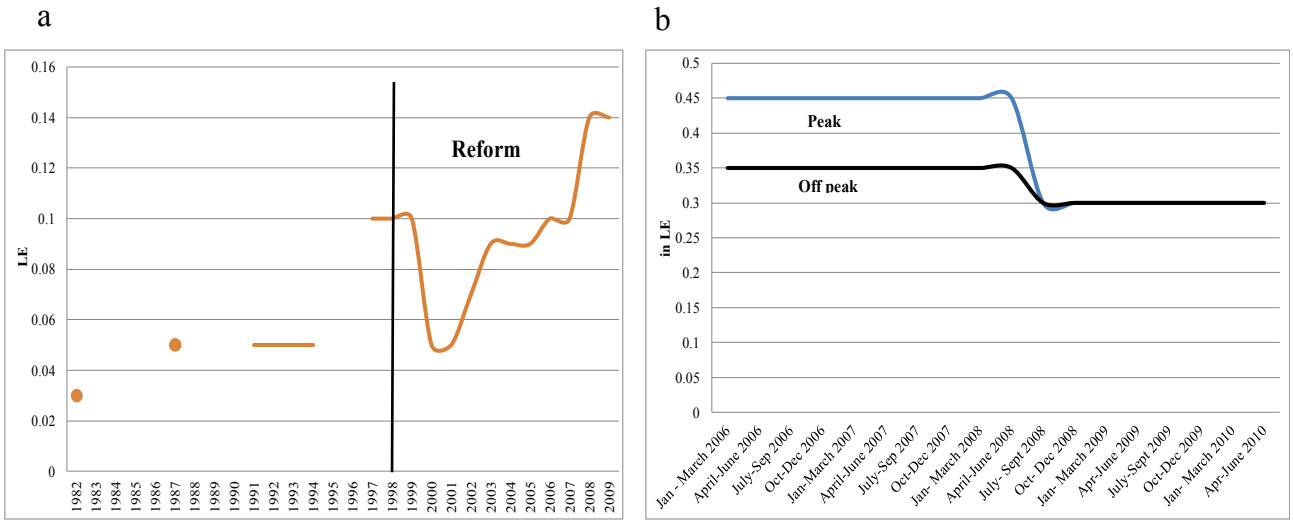

Fig. 9. Fixed-Line Per Minute Charges. a: Fixed-Line 3-Minute Tariffs for Local Calls: Fixed to Fixed (1982–2009). b: Fixed-Line per Minute Rates for Calls to Cellular by Time of Day (2006–2010).
Source (a): ITU Database, 2010. (b): MCIT Database, 2010. Note: Prices apply to both residential and non-residential customers.

Table 4
Fixed-line and cellular subscribers in thousands and growth rates. (Selected years).

	1982	1984	1997	% growth per annum 1984–1997	1998	2008	2011	% growth per annum 1998–2011
Fixed lines in operation	42	561	3453	85%	3972	11,853	8714	7%
Numbers of cellular subscribers	0	0	0	0	195	41,300	83,425	73%

Source: MCIT Database, 2012

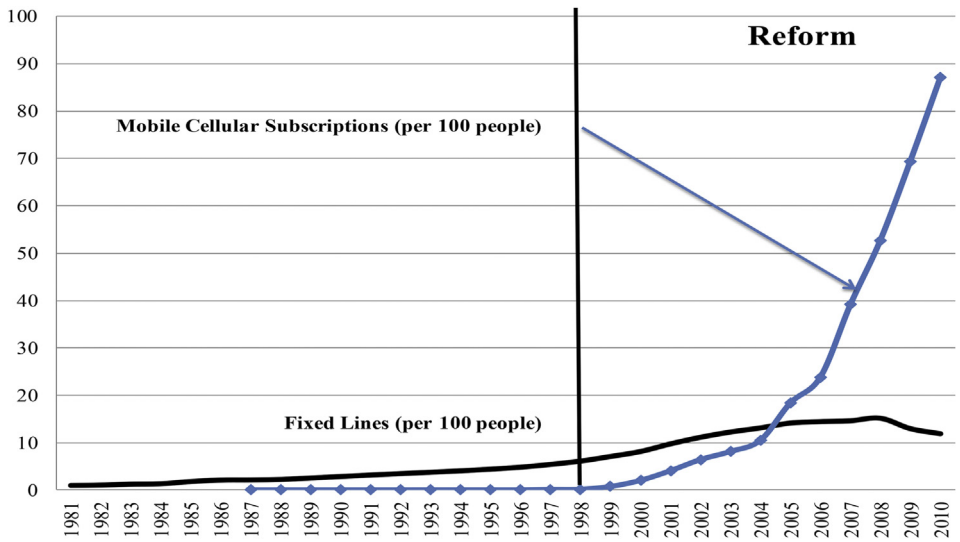

Fig. 10. Fixed and cellular density (1981–2010).
Source: United Nation (UN) database, 2012.

price discrimination leads to improvement in access and coverage, consumer welfare under price discrimination is higher than under uniform pricing.

5.1.2. Access to service: fixed versus cellular access

Access has dramatically improved from a very small base of about 42 thousand main fixed lines in 1982 to more than 11 million by 2008 (Table 4). It is not clear to what extent this increase can be attributed to the reform. Since the early 1980s, fixed-line density has been steadily increasing (Fig. 10) at an average annual growth rate of 85% (Table 4).[46] Growth in access after the reform period averaged 7%, much less than the growth rate prior to the reform.

[46] In the year immediately following the reform the number of fixed-lines in operation increased by more than a quarter (29%, not shown in the table)' an absolute increase of more than a million from 3.97 to 5.13 million lines/subscribers.

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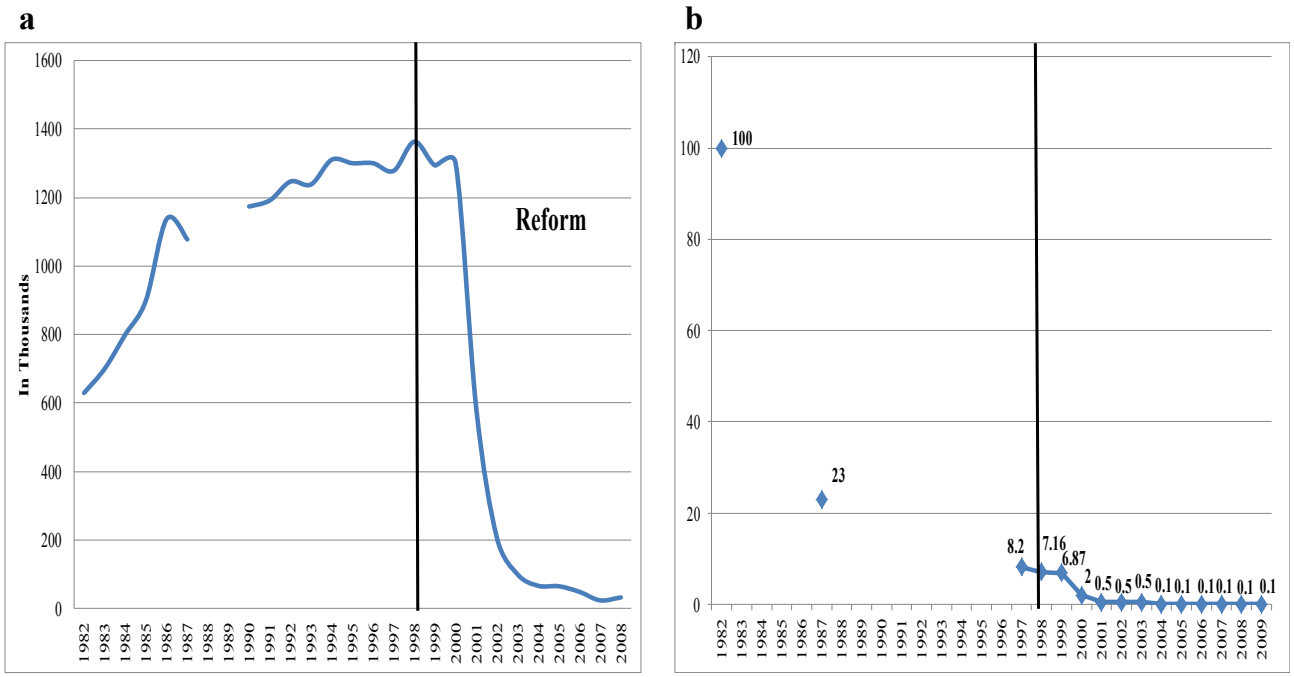

Fig. 11. Quality Indicators. a: Fixed-line Waiting List (1982–2008). b: Fixed-line Faults (per 100 mainlines 1982–2009).
Source: ITU database, 2010.

This moderate growth rate mirrors the growth in cellular phone subscribers leaping from less than 200 thousand subscribers in the first year they were introduced (1998) to more than 83 million by 2011 (Table 4). The annual growth rate amounted to 73% between the years 1998 and 2011. Nearly all of the Egyptian population now has cell-phone access whereas just over 10 per 100 have fixed-line access (11.86 per 100 people, Fig. 10). Because one fixed-line caters for the entire household or organization, assuming an average household size of four, fixed-line access is more accurately stated as 47% or around half the population. Overall coverage (i.e., cellular plus fixed) increased from 3.4 million people in the year preceding the reforms to 92.1 million by 2011, a remarkable increase. Though as seen above, Egypt is still outperformed by around half of all MENA countries.

5.1.3. *Quality of service*

Reforms are expected to improve service-quality indicators, such as superior service continuity, fewer service interruptions, enhanced customer service, more accurate billing, and shorter waiting times for new connections. The low quality of earlier periods resulted in lost potential production and lower household welfare.

As a result of Egypt's antiquated and extremely congested system, telephone reception was very poor until the early 1990s. Many dialing attempts were required to make a local call, dial tones were sometimes unobtainable for hours, and lines were often out of order. The connection rate was estimated between 25 and 40% and disconnections in the middle of conversations were common. A transportation study reported that 30% of road traffic was due to inadequate phone services, so businesses had to send thousands of couriers to deliver messages and some international firms seeking to operate in the Middle East were reluctant to establish offices in Egypt because telecommunications were so inadequate (USAID, 2004). A narrow range of services was offered to customers at a time when a revolution in the sector was evident elsewhere around the world (Galal, 1997).

The waiting period for a fixed-line had reached 13 years in the 1980s, declining to "only" 5.7 years in 1995–1996 (Galal, 1997; ITU, various issues). Data on the waiting period are no longer available, rather there are data on the number of people waiting to have a fixed-line installed. These numbers show a marked decrease from a peak of nearly 1.4 million in 1998, down to 32 thousand in 2008 (Fig. 11a).

Remarkable progress has been made in fixed-line quality, from automated billing facilities to a wide range of services (e.g., caller id, call forwarding, etc.) and a significant reduction in telephone faults. Fault rates have declined from faults taking place in every single fixed-line in 1982 to just 7.16 faults per 100 lines in 1998 (Fig. 11b). Since 2004, there were a negligible 0.1 faults per 100 line. As with the access indicators, quality improvements are not necessarily attributable to the reforms since they had been steadily improving for many years prior to the reform. The new 2003 telecommunication law made it NTRA's responsibility to ensure high quality of services and to set up a user complaint system. NTRAs department of operation and monitoring, its largest, conducts quality checks on a regular basis. No specific quality targets are set, which is something NTRA should consider. But quality complaints are treated seriously and dealt with promptly, with 98% of faults in 2011 cleared by the next working day (Annex 2 Fig. 24, Interview Material, November 2010c; MCIT, 2012).[47]

5.2. *Workers: employment, wages and productivity*

5.2.1. *Employment*

Transforming ARENTO into a private law company (Telecom Egypt) and private sector participation (IPO of TE of 20%) should in

[47] Devkar et al. (2013) distinguish between product quality and service quality. Panel 12b above pertains to the former but 12a and Annex 2 Fig. 24 to service quality. Systematic review evidence shows that, in the telecoms sector, improvements in access and service quality are usually greater than those in product quality as the former have a more immediate impact on revenues and profits.

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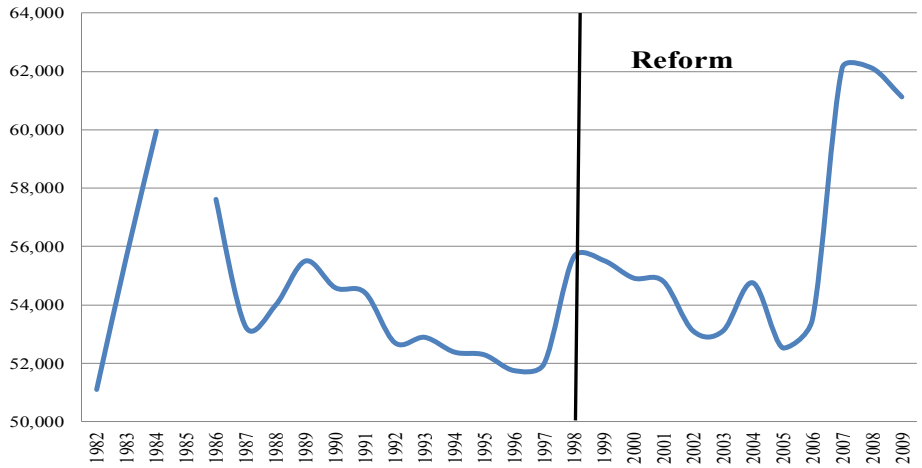

Fig. 12. Total employment in telephony (1982–2009).
Source: ITU database, 2010.

principle reduce employment due to increased pressure for greater efficiency; likewise for regulatory reform. Typically, reforms of public utilities that are characterized by labor hoarding are likely to lead to immediate and significant reduction in employment. Evidence of typical employment reduction is in the range of 30–50% (Foster et al., 2005). Indeed, some NTRA staff members believe in the need to cut in employment at Telecom Egypt (TE). However, due to fear of social unrest, the numbers of employees in Telecom Egypt are not expected to fall dramatically if at all. In fact, interviews (Interview material, May 2010b) indicate that the government is likely to keep most of TE's employees until they eventually retire. In addition, due to the modest skill level of many of the approximately fifty thousand TE employees, new hires of qualified personnel are taking place to meet the skill gap. If present, negative employment effects are normally offset by liberalization of the sector, which allows entry into previously un-contestable markets and so, in turn, triggers market expansion. The three cellular and numerous telecommunications companies are thus expected to raise overall employment in the sector. This expansion of employment by new providers has outweighed any contractionary effects from seeking efficiency gains, if indeed such pressures apply. Overall employment in the sector witnessed two hikes, one after the reforms were introduced in 1998 and then later after the sale of TE shares (2005) and the entry of the third cell-phone operator (Etisalat in 2007) (Fig. 12d). Separate employment data for TE are not systematically available but interview material suggests they stood at around 50,000 employees in 2010.

5.2.2. *Wage per employee*

The effect on wage income depends on the final direction of wages of those workers laid off (if any), changes in wages in workers remaining in the sector, and wages received by employees of the industry's new entrants. Wages of the newly hired are typically expected to be lower due to increased competition. Nevertheless, given the shortage in skilled labor, wages are anticipated to be higher, but conditions in terms of working hours, amount of leave, job stability (e.g., shorter contract duration) are likely to be worse. With the skill gap and pressures for yearly wage increases in government jobs, annual total wage per employee at both current and constant prices has been increasing since 1998, the year marking the reform (Fig. 13). Wages have increased from nearly LE 2 thousand a year in 1998 (LE 146 per month, LE 61 in real

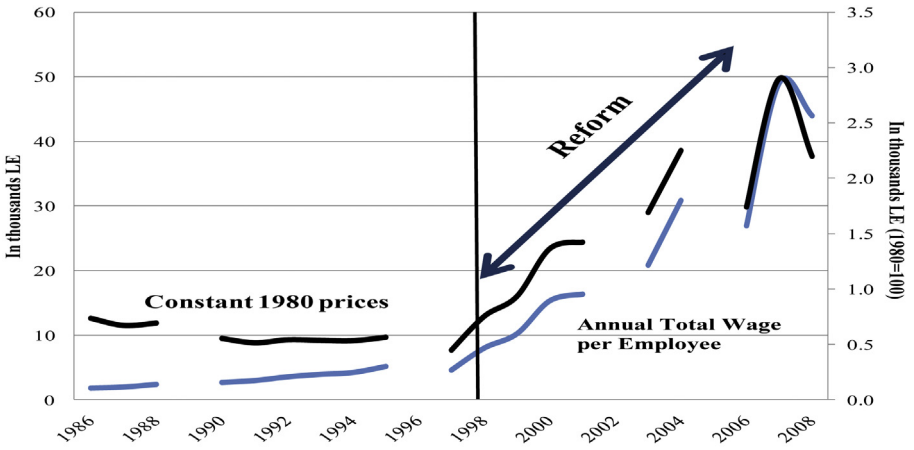

Fig. 13. Annual total wage per employee (1986–2008).
Source: Calculated by author based on Central Agency for Public Mobilization and Statistics (CAPMAS), Telecommunication Annual Report, Various issues. Total wages include: wages and salaries; bonuses; in kind benefits; and insurance and pensions. Data converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.

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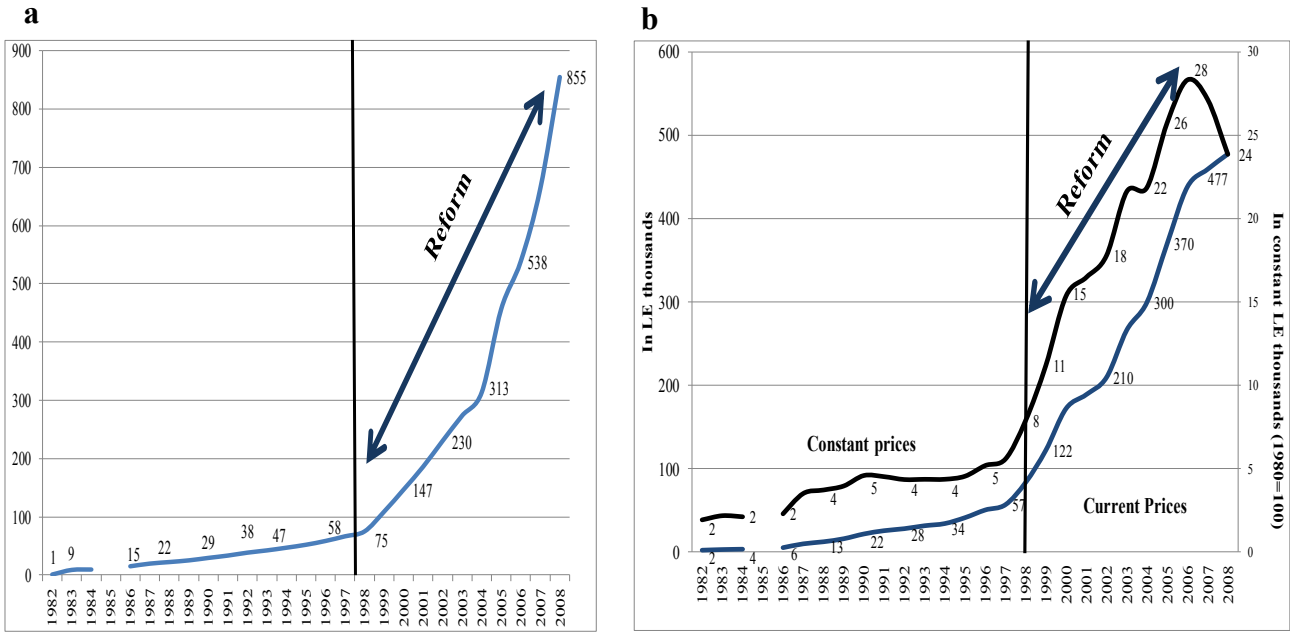

Fig. 14. Improvements in Labor Productivity. a: Telephone Lines (cellular and fixed) per Telecommunication Sector Employee (1982–2008). b: Telecommunication Revenue per Telecom Sector Employee (1982–2008).
Source (a): Author's Calculations based on World Development Indicators (WDI), World Bank, 2010 and MCIT Database, 2010. Telecom employees: World Development Indicators, Cellular & Fixed lines: MCIT Database.(b): Author's Calculations based on Euromonitor International Data, 2010 and World Development Indicators (WDI), World Bank, 2010. Revenue: Euromonitor International, Telecom employees: World Development Indicators. Values converted from nominal to real using CPI from World Development Indicators (WDI), World Bank, 2010.

terms) to about 50 (LE 4091 per month, LE242 in real terms) in 2007. Given the near zero lay-offs in TE[48] it is fairly reasonable to assume that the indicator below is a good indicator for the direction of wages in the sector.

5.2.3. *Improvements in productivity*

A simple measure of productivity picks up signs of improvement: the number of lines per employee (both cellular and fixed) rose from one line per employee in 1982 to 855 lines in 2008 (Fig. 14a), with growth being most rapid in the post-reform period (at an average rate per annum of around 30%). The same is true of telecom revenue per employee, which grew from just LE 2000 per employee in 1982 to LE 477 thousand in 2008 (Fig. 14b).

5.3. *Competitors: the sector's incumbent operator TE*[49]

The ease of entry conditions supported by the sector's regulator has overall benefitted all new entrants. But for the sector's incumbent, Telecom Egypt, the story is more complicated. For every reform, there are winners and losers; TE is both. After an initial period of growth, additional competition (particularly after Etisalat's entry) has negatively affected TE's retail market. With fixed-line subscriptions falling since 2008, TE's market share has shrunk from 95% in 1998 to just 9% in 2011 (Annex 2 Table 6). In the international voice market, TE's international minutes started to decline since 2005, its share dropping from a third in 2003 (31%) to 12% in 2009 (Table 1).[50] By contrast, the market shares of Vodafone and Mobinil have been expanding, with the former capturing the largest share. Lines, revenues, and minutes per employees, consolidated revenues, profits, and other financial highlights all tell a similar story: an improvement post reform but then a setback thereafter (Fig. 15, Annex 2 Figs. 25–31; Table 9; Table 10).

To offset these losses TE is relying heavily on its wholesale market.[51] It operates a revenue-sharing model with the cellular companies and internet-service providers. The model is achieved through two distinct channels, namely: a 45% share-holding in Vodafone Egypt[52]; and all third-party network leasing (e.g., cellular interconnectivity for national and international voice services, transmission services, renting of its submarine cable, etc.). The first channel allows TE to directly benefit from the rapid growth of the cellular market and the second is made possible through effectively taking advantage of its monopoly over the international gateway and infrastructure.

5.3.1. *Similarities of internet and broadband*

The situation for the internet and broadband markets resembles that in the international voice market. All ISPs have to lease TE's infrastructure for internet provision. But the company's infrastructure is run down in many areas of the country, especially in older built-up areas. The internet market in Egypt has several adverse characteristics. First, behavioral practices in this market are unethical, with many people sharing the cost of one line. Second, only a small segment of the market values extremely high internet speed comparable to that experienced in developed countries. Finally, TE infrastructure is already in place, giving it a first mover advantage in the market. These factors reduce incentives for any potential providers to build a parallel infrastructure to that of TE. The main concern is whether they can capture a reasonable share of the market by overcoming TE's first-mover advantage. This may be possible if NTRA plays the same role it played easing the entry of

[48] So it is unnecessary to follow the wages of the laid-off in the industry.
[49] has four subsidiaries: TE Information Technology, TE Data, Centra Technologies, and Middle East Radio Communications (Telecom Egypt Company ETEL, 2010).
[50] By contrast, the market shares of Vodafone and Mobinil have been expanding, with the former capturing the largest share.
[51] In recent years wholesale revenues have grown increasing from 42% of the "total service related revenues" in 2009 to 52% two years later (Telecom Egypt Earning Releases, 2009, 2011).
[52] A similar situation for the internet and broadband markets with TE fully owning TE Data, also a competitor in broadband and internet retail.

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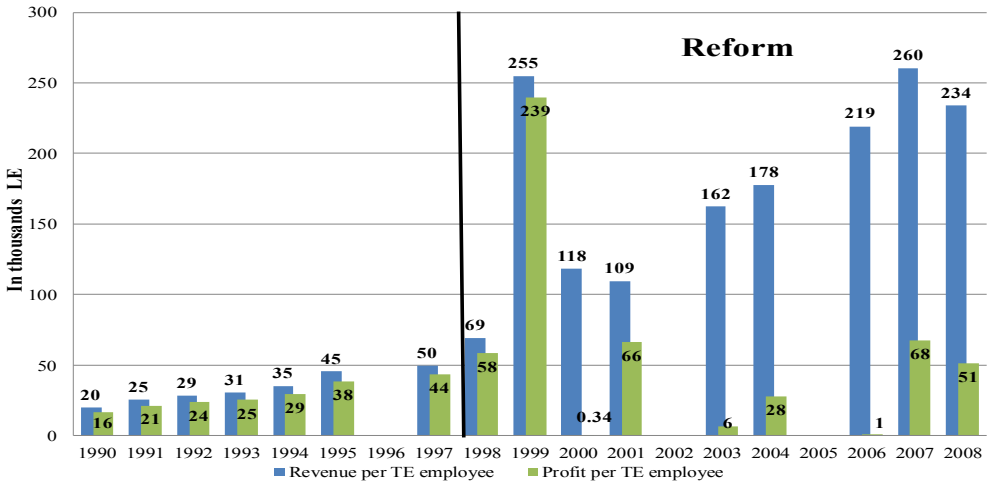

Fig. 15. Telecom Egypt revenue and profit per employee (1990–2008).
Source: Calculated by the author based on Central Agency for Public Mobilization and Statistics (CAPMAS), Telecommunication Annual Report, Various issues.

Etisalat by ensuring that no anti-competitive practices take place such as those in favor of TE Data or Vodafone (see details in following section). TE has repeatedly violated the competition law, most recently in 2016 in its failure to fully reconnect the cellular providers to the infrastructure in areas where it installed new optical fiber cables (Al-Aees, 2016). If NTRA plays a supporting role towards the potential entrant, lower prices will expand market size, hence guaranteeing the most competitive firms a reasonable share of the growing market despite the competition.

In brief, the reforms have enhanced TE's efficiency and performance but not enough to withstand the aggressive competition from the cellular sector. TE is both a winner and a loser of reform. It stands to lose if it does not follow a more inventive business model or introduce measures to enhance efficiency.

5.4. Government

5.4.1. Telecom Egypt's dividends

Utility reform affects public funds in two distinctive ways: one-time windfall gains and ongoing net fiscal flows. The former is generated if assets are sold. Ongoing fiscal flows are generated when reforms manage to secure financially sustainable tariffs for the utility service, in turn allowing substantial reductions or even complete halting of state subsidies. Additionally, some concession contracts are designed to generate a royalty payment (Foster et al., 2005). Voice telecommunication contributions to the treasury cannot be singled out, but Annex 2 Fig. 32 provides detail on the entire sector's (ICT) contribution, which rose largely in 2006 after Etisalat was granted its operating license and following the partial sale of TE in 2005. Telecom Egypt's dividend payments to government have increased since the reform, though the increase in constant prices is not marked (Fig. 16). Indeed, looking at period averages, TE's dividend to the treasury has remained more or less constant (−1%, Table 5 though gap in the data blurs the judgment). These dividends are meant to be distributed according to the 80% state ownership share of the government but in reality these are distributed through negotiations between TE and the MoF.

5.4.2. Other regulatory goals: NTRA's role

In principle, the government should be concerned with the independence and efficiency of the regulator. However, clearly there are issues regarding independence.[53] In terms of efficiency, the reforms to date have liberalized the sector and introduced competition. NTRA played a positive role to lower entry barriers to the sector, particularly easing Etisalat's entry into both the national and international voice markets. Given the strength of the two cellular incumbents, Etisalat's entry would have proved difficult without the direct support of NTRA. To level the playing field, NTRA introduced a number of measures. Etisalat was allowed: 1) "domestic roaming", permitting it the use of the other operators' networks inside Egypt in locations where its own network was not yet in place; 2) sharing of existing operators' equipment through collocation, resulting in cost savings; 3) number portability to reduce consumer switching cost[54]; 4) a grace period of five years before granting another license (Interview material, November 2010c); and 5) interpreting the "equality of treatment" between cellular companies clause in a way that favors Etisalat. For example, TE gives Vodafone a quantity discount for interconnection charges that Etisalat would not qualify for given limited traffic with TE. To help Etisalat establish itself, NTRA decided that equality was not to be interpreted as administering the same volume discount system to both, rather it meant fixed interconnection charges among all cellular companies (Interview material, May 2016). The same may not be the case with respect to easing Mobinil's acquisition of an international gateway license as it contradicts with NTRA's main goal of preserving government revenues and so protecting the incumbent, as discussed below. Overall as a result of the reforms, concentration indices such as the HHI have significantly improved and market power has declined substantially in the sector.

On the other hand, signs of NTRAs regulatory capture have limited the effectiveness of the regulator. As discussed above, favoritism towards the ailing incumbent, and to a lesser extent towards existing providers, manifested itself in a number of areas: 1) favorable interconnection charges to Vodafone and similarly to TE Data; 2) delay in granting Mobinil an international gateway license; 3) restriction of domestic access to voice over internet services (VoiP); and 4) turning a blind eye had there been an actual cartel between Vodafone and Mobinil before Etisalat's entry into the market. With the data at hand, there is no conclusive evidence of cartel formation or predation, but interview material strongly asserts these claims. Interviews also suggest that NTRA has allowed the two cellular giants to become sufficiently strong to the extent that they sometimes refuse to submit information requested by

[53] Network research has also shown the strong links between NTRA and the government represented by MCIT (Badran, 2012a, 2012b).

[54] Switching costs are any costs incurred by the consumer on account of switching from one provider to another. In the phone market for instance these costs include the cost of informing others of one's new number.

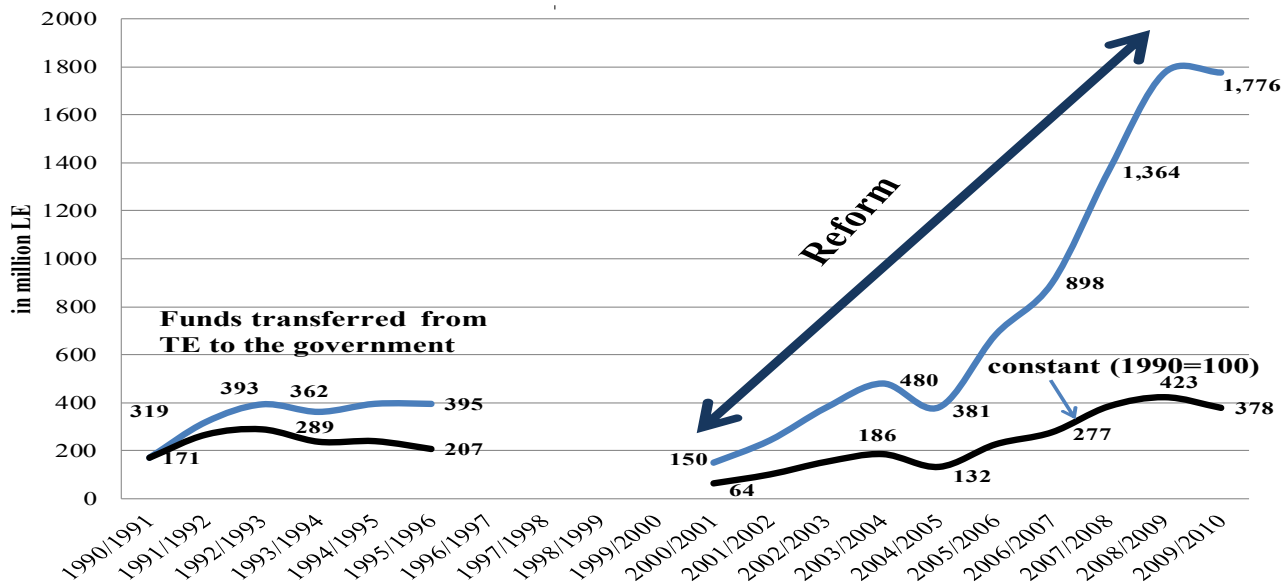

Fig. 16. Transferred funds from TE to the government (1990–2010).
Source: Ministry of Finance (2010). Funds converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.

Table 5
Pre and Post Reform TE Dividend to the Treasury in LE million (1990–2010).

	Average 1990/91–95/96	Average 2000/01–09/10	% Change between periods
Actual Dividend from TE	339	813	140%
At constant prices (1990 = 100)	235	232	−1%

Source: Ministry of Finance (2010). Dividends include LE100 million that were used by the treasury to finance the underground. Funds converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.

NTRA (Interview material, May 2010b).

Evidence also suggests that this is the prevailing perception of the majority of regulated companies in the industry. According to interviews, "At the same time the NTRA has a special relationship with TE. Because of this close relationship between TE and TE Data the former always gives the latter preferable treatment" and "One example of such a special relation is that sometimes the NTRA consults TE first before other regulated companies." (Interview material in Badran, 2012b).

6. Conclusion

The main lessons learned from this study are that reforms in the Egyptian telecommunication sector have complemented and reinforced each other. The causal chain of reform is not broken. The reforms to date have collectively created reasonably contestable markets characterized by free entry and exit, triggering competitive pressures and efficiency improvement. As a result, welfare gains have accrued to consumers, producers (competitors), and the state alike. Following reforms, there have been marked improvements in access, in the overall price and quality of voice services, in overall employment, in average wages, in productivity indicators, and in funds to the government, mainly from TE. However, the captured regulator clearly favors Telecom Egypt, the national incumbent, to protect government revenue as well as to avoid social unrest of its 50,000 or so employees, albeit in a shortsighted and often inefficient manner.

The sector's regulator, NTRA, is a major player in this market and has done a reasonably good job in managing the reform. There is more to accomplish. Additional TE privatization is advised. The authority can eventually introduce an additional fixed-line license after some years from the additional privatization to induce further competition in the sector, in turn effecting further price reductions, more options, and better service. These changes will enhance consumer surplus whilst preserving normal profits in the sector. Excess profits will be eliminated only if the concerted efforts of both NTRA and the Egyptian Competition Authority prevent and detect collusion and predation, the main anticompetitive practices likely present in the market. Appropriate disclosure and regulatory requirements, such as financial reporting and auditing, should be enforced without exception to counteract corruption and feed information into NTRA's own costing and competition analysis. NTRA needs to expertly staff itself and adopt international best practices in regulation.

Social welfare is a broad concept that does not just pertain to competitors' welfare but encompasses a wide array of stakeholders with potentially opposing interests. Other stakeholders include the government and the many million consumers that will be affected by the deteriorating performance of the incumbent, resulting in higher prices and poorer quality compared to what is potentially attainable by existing and potential entrants to a sector yet to fulfill its growth potential. NTRA must be impartial and serve all of these interests collectively, keeping each at arm's length with an eye on overall welfare[55] and realizing that protecting inefficient market insiders, be it firms or workers, is always at the expense of more efficient and deserving outsiders.

[55] Caveats: This study has limitations on account of data unavailability. For example, the National Voice Market covers both local and national long distance services, that is within and between governorates respectively. Detailed information on traffic for each provider for each of these services in addition to international voice would be preferable to make the analysis as detailed and rigorous as possible. Unfortunately, efforts to obtain these data have been unsuccessful. So the numbers of subscribers are often used as a proxy for call volume. The same is true for cost data before and after the reform. This information would have been able to confirm or refute some of the more tentative conclusions of this study. Second, the study has focused on voice drawing some corollaries for internet and broadband based on purely qualitative information. Originally we intended to quantify the welfare effects but with no cost data and many missing years, especially of pricing data and no data on minute usage it has not been possible to undertake this analysis.

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Annex 1. Summary of expected impacts of different types of utility reform.

	Employment and wages	Price of Service	Quality of service	Access to service	Asset ownership	Fiscal flows	Entry conditions
Public Sector Reform	Employment may fall because of increased pressure for efficiency	Prices may adjust upward or downward toward efficient cost-reflective levels	Quality may improve because of better management	Access may improve because of improved finances	n.a.	Subsidies to the sector may be reduced	n.a.
Private Sector Participation	Employment should fall because of increased pressure for efficiency	Prices should adjust upward or downward toward efficient cost-reflective levels	Quality may improve because of better management	Access may improve because of improved finances	Asset sales increase private ownership, concentration depends on design details	Subsidies to the sector should be reduced, sale revenues may be large, and ax revenues may follow thereafter	n.a.
Regulatory Reform	Employment may fall because of increased pressure for efficiency	Prices should adjust upward or downward toward efficient cost-reflective levels	Quality should improve because of increased oversight and accountability	Access should improve because of increased oversight and accountability	n.a.	Subsidies to the sector should be reduced as tariffs converge to cost-reflective levels	Regulatory decisions may affect terms of competition between providers.
Sector restructuring	Ambiguous effects on employment	n.a.	n.a.	n.a.	Decentralization transfers assets to sub national governments	Responsibility for subsidiza-tion may shift to subnational government	n.a.
Market liberalization	Employment may rise because of sector growth, but wages may fall because of competition	Prices should fall because of competitive pressures	Quality should improve as a result of competition	Access should improve because of entry of new providers, and wider consumer choice	Private ownership increases because of entry of new operators	Entry fees may generate revenues, and tax revenues should increase	Liberalization should pen up market for entry of new players

Source: Adapted from Foster et al., 2005. Note: n.a. = not applicable a: may indicates possible impact.b: should indicates probable impact.

Annex 2. Additional figures and tables.

Table 6
Evolution of Market Shares and Concentration Levels (Overall Market) (Subscribers in thousands, share in %, 1997–2011).

	Telecom Egypt	Vodafone	Mobinil	Etisalat	Total Subscribers	Concentration Indices		
						HHI	CR_1	CR_2
1997	3453	0	0	0	3453	1	100%	
	100%	0	0	0	100%			
1998	3972	37	158	0	4167	0.91	95%	99%
	95%	1%	4%	0	100%			
1999	5131	332	576	0	6039	0.73	85%	95%
	85%	5%	10%	0	100%			
2000	5856	1012	1218	0	8086	0.56	72%	87%
	72%	13%	15%	0	100%			
2001	6695	1601	1851	0	10,147	0.49	66%	84%
	66%	16%	18%	0	100%			
2002	7736	2143	2352	0	12,231	0.47	63%	82%
	63%	18%	19%	0	100%			

(*continued on next page*)

Table 6 (*continued*)

	Telecom Egypt	Vodafone	Mobinil	Etisalat	Total Subscribers	Concentration Indices		
						HHI	CR_1	CR_2
2003	8736	2740	3057	0	14,534	0.44	60%	81%
	60%	19%	21%	0	100%			
2004	9464	3569	4074	0	17,107	0.41	55%	79%
	55%	21%	24%	0	100%			
2005	10,396	6125	7505	0	24,026	0.35	43%	75%
	43%	25%	31%	0	100%			
2006	10,808	8734	9267	0	28,809	0.34	38%	70%
	38%	30%	32%	0%	100%			
2007	11,229	13,333	15,089	1643	41,294	0.31	37%	69%
	27%	32%	37%	4%	100%			
2008	11,853	17,611	20,101	3560	53,125	0.31	38%	71%
	22%	33%	38%	7%	100%			
2009	10,313	23,325	25,354	6673	65,665	0.31	39%	74%
	16%	36%	39%	10%	100%			
2010	9618	31,788	30,225	8648	80,279	0.33	40%	77%
	12%	40%	38%	11%	100%			
2011	8714	36,663	32,914	13,849	92,139	0.32	40%	76%
	9%	40%	36%	15%	100%			

Source: Numbers of subscribers: Egyptian Ministry of Communication and Information Technology (MCIT) 2012, Market share, HHI, CR1, CR2: calculated from MCIT Database
Note: *Concentration Ratio (CR_n) is the market share of the top n firms in the industry; here we calculate the share of the top firm (CR_1) and the top two firms (CR_2) in the market.
*The Herfindahl-Hirschman Index (HHI) is calculated as the sum of squares of market shares.
$HHI = \sum_{i=1}^{N} S_i^2$, where.
1) i is the ith firm of the industry where i = 1 … N; 2) N = # of firms in the industry.
3) Extreme cases: in perfect competition HHI = 0, in pure monopoly HHI = 1; and so $0 \leq HH \leq 1$.

Table 7
Fixed-Line International Outgoing Calls (Pre- and Post- Reform).

	1981–1997	1998–2005	2006–2009
Average minutes	53,357,234	261,252,056	121,516,390
Growth rate		390%	−53%

Source: Author's calculations based on ITU database, 2010.

Table 8
Capital Investment in Communication and Growth (in LE million).

	1980–1997	1998–2009
In constant 2009 prices	2671	8981
In current prices	553	6529
Growth Rate (%)	10.7%	48.5%

Source: Author's calculations based on ITU database, 2010, Euromonitor, 2009 (1981, 1995–1998). Capital investment converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.
Note: Growth rate is calculated as $GR_{t,t+n} = ((Value_{t+n} - Value_t)/Value_t) * 100)/n$; where n = number of years of difference between year t and t + n, $Value_{t+n}$ = Value in year $_{t+n}$, and $Value_t$ = Value in year t.

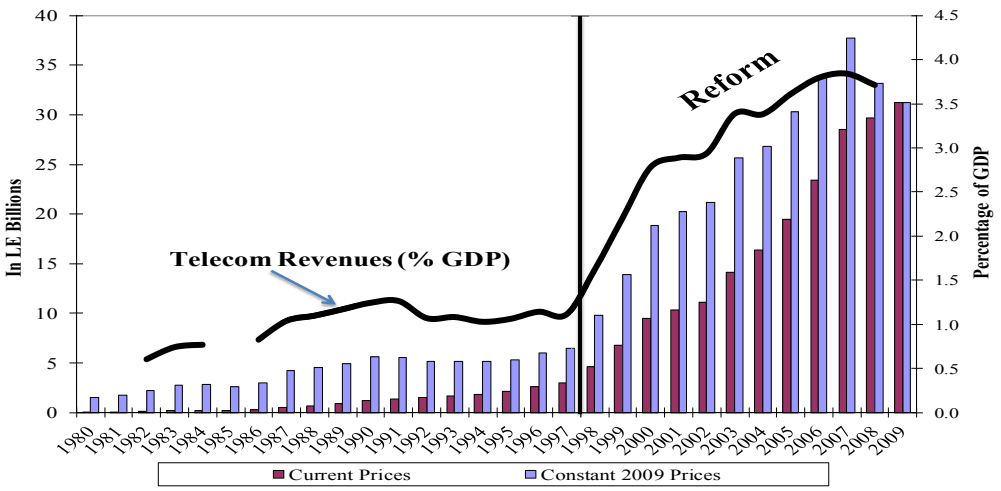

Fig. 17. Total telecommunication revenues and share in GDP (1980–2009). Source: Revenues: Euromonitor International, 2010; Share in GDP: World Development Indicators, World Bank, 2010.

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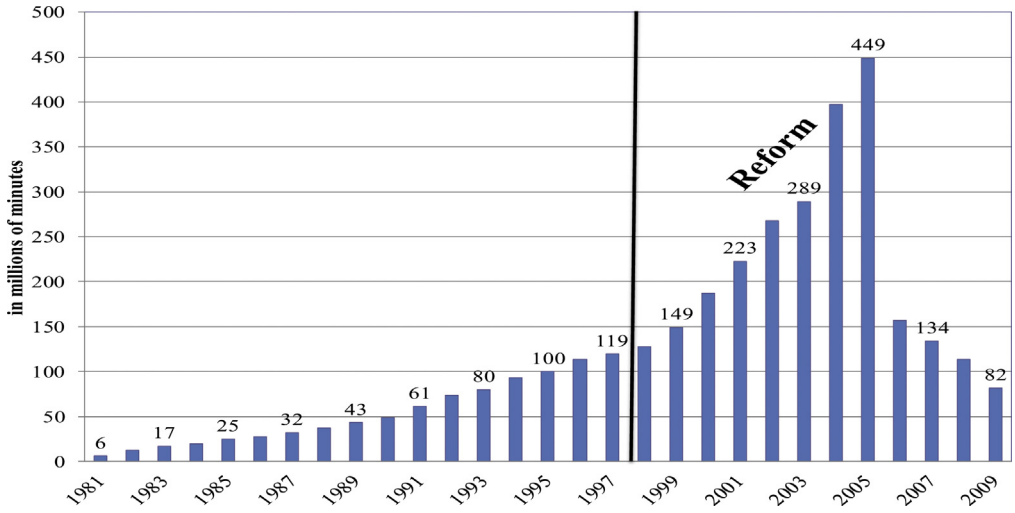

Fig. 18. Fixed-Line International Outgoing Minutes (in millions). Source: ITU database, 2010.

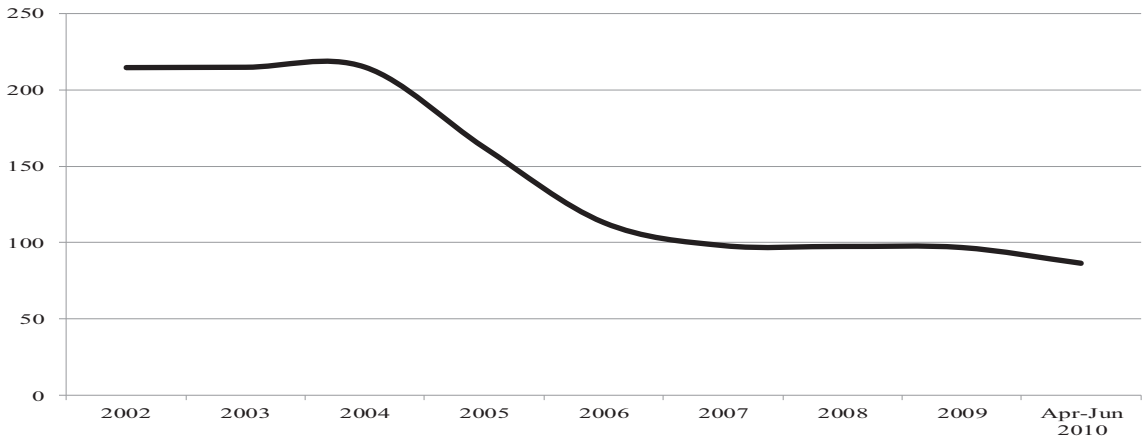

Fig. 19. Telecommunication deflator (2002–2010).Source: ICT indicator portal, MCIT Database, 2012.

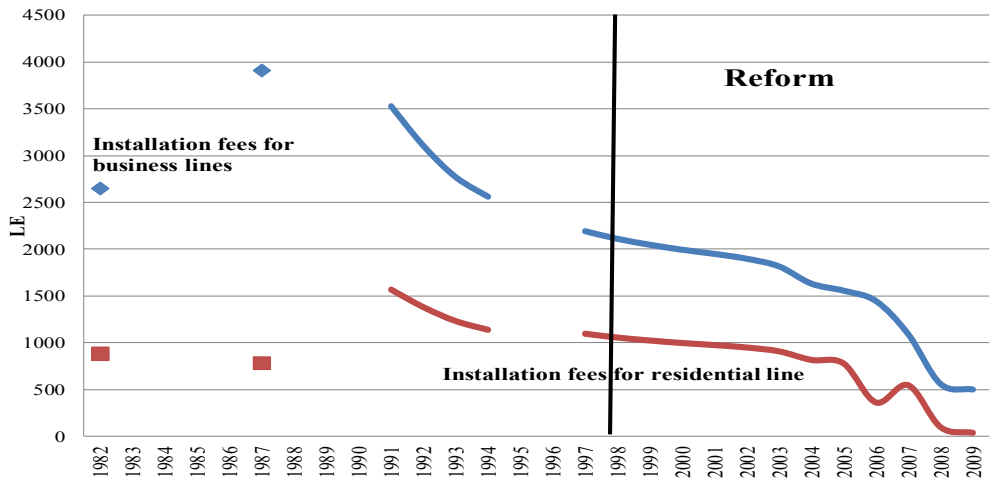

Fig. 20. Land-line fixed installation charge by line type (constant, 2009 prices) (1982–2009). Source: ITU Database, 2010. Values converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.

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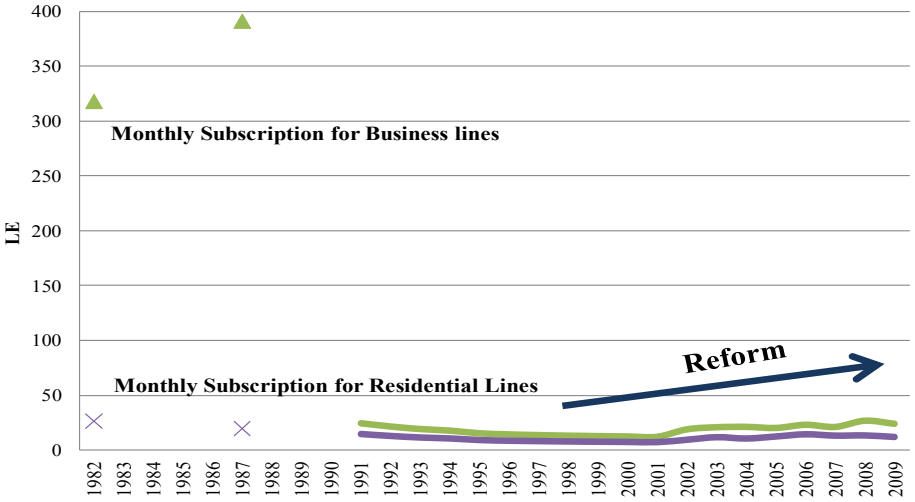

Fig. 21. Land-line monthly fixed subscription charge by line type (constant, 2009 prices) (1982–2009). Source: ITU Database, 2010. Values converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.

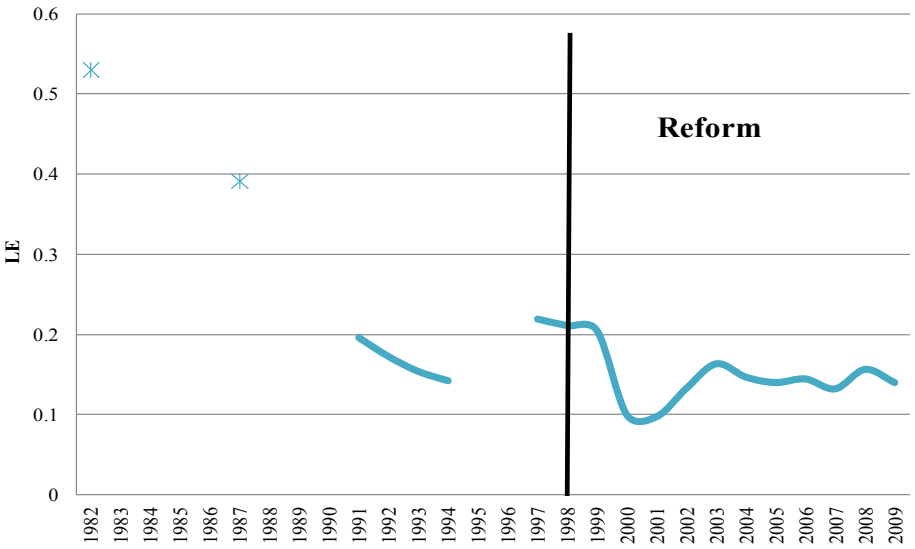

Fig. 22. Fixed-line 3-minute real tariffs for local calls: Fixed to fixed (constant, 2009 prices) (1982–2009). Source: ITU Database, 2010. Tariffs converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.

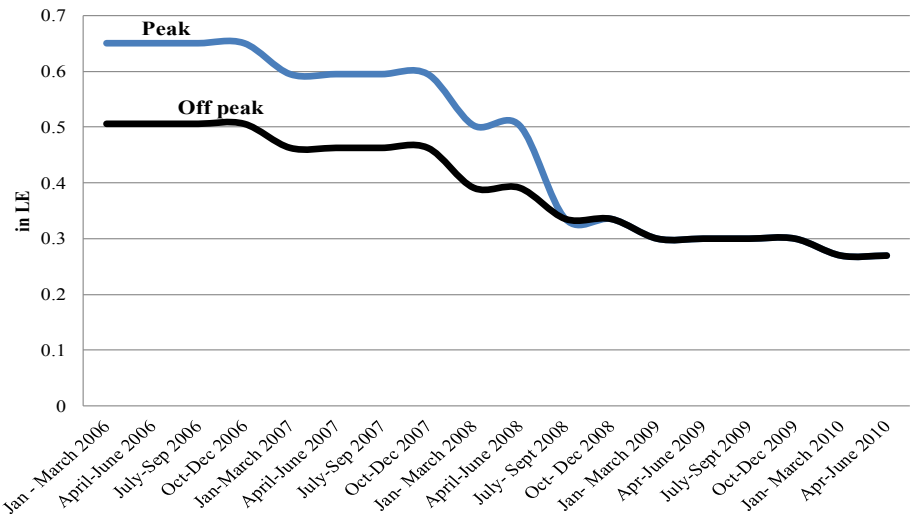

Fig. 23. Land-line real per minute rates for calls to mobiles by time of day (2010 prices) (2006–2010). Source: ITU Database, 2010. Rates converted from nominal to real using CPI from World Development Indicators, World Bank, 2010.

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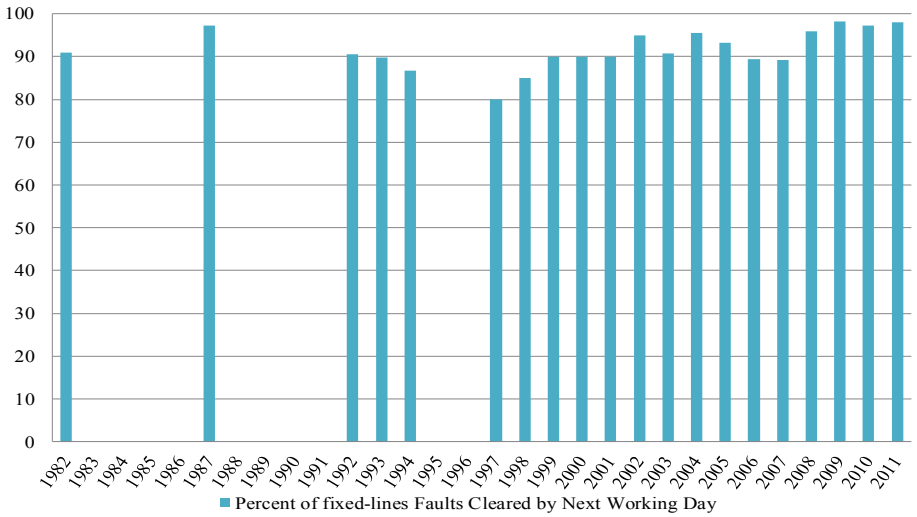

Fig. 24. Fixed-line faults cleared by next work day (1982–2011). Source: data for 1982–2002 ITU database, 2010; data for 2003–2011 MCIT, 2012.

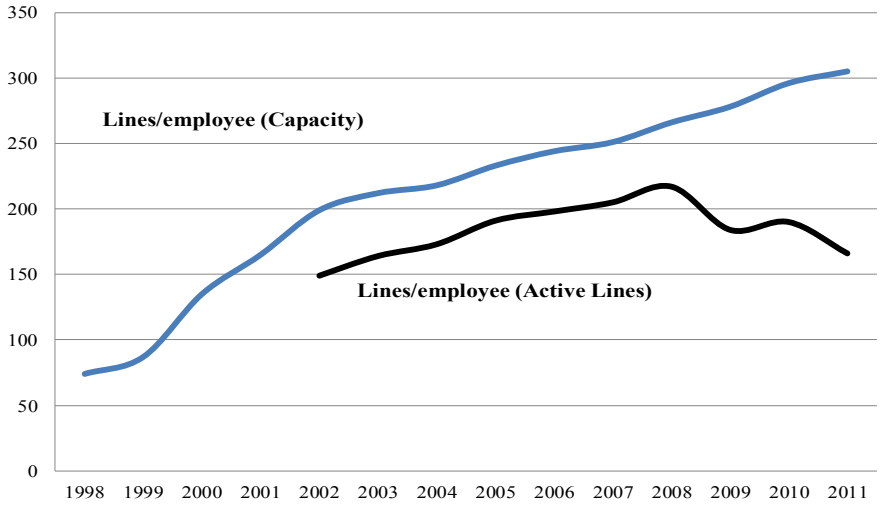

Fig. 25. TE lines per employee (1998–2011). Source: Telecom Egypt, 2012.

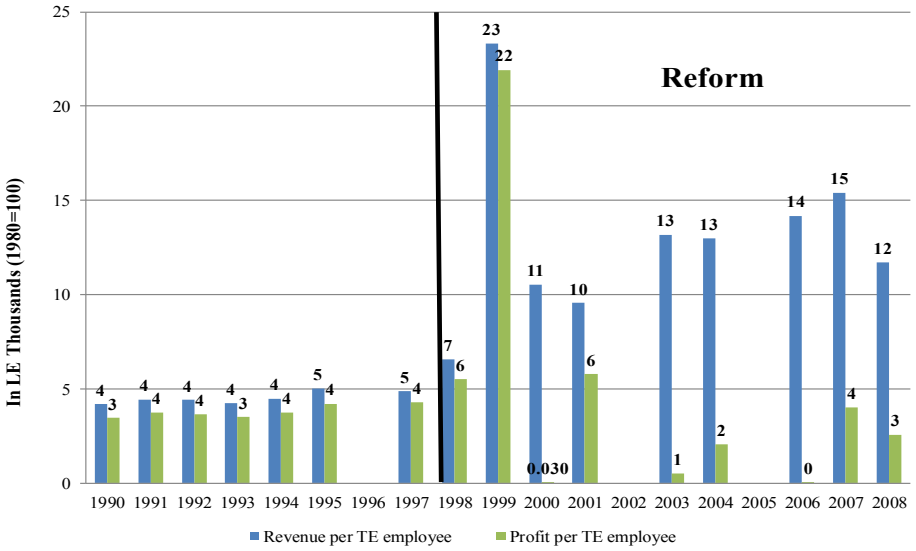

Fig. 26. TE's revenue and profit per employee at constant 1980 prices (1990–2008). Source: Calculated by the author based on Central Agency for Public Mobilization and Statistics (CAPMAS), Telecommunication Annual Report, Various issues. Note: Values converted from nominal to real using CPI from World Development Indicators (2010).

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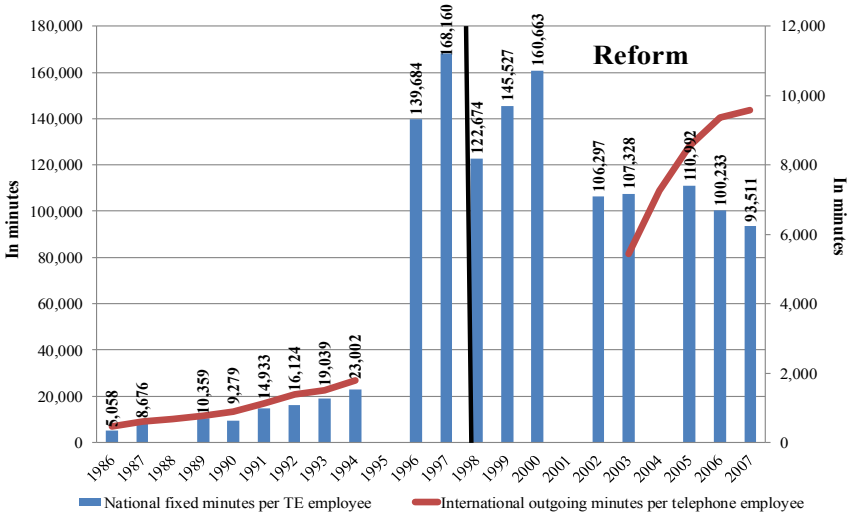

Fig. 27. Domestic and international minutes per TE employee (1986–2007). Source: Calculated by the author based on Euromonitor International Data, 2010, Central Agency for Public Mobilization and Statistics Data (CAPMAS), Telecommunication Annual Report, Various issues and World Development Indicators (WDI), World Bank, 2010. Minutes: Euromonitor International, TE Employees: CAPMAS, Telephone Employees (sector employees): World Development Indicators.

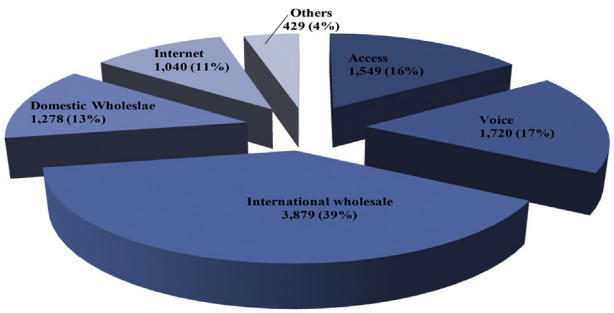

Fig. 28. TE Service Related Revenue Breakdown in million (2011). Source: Calculated from Telecom Egypt Earning Releases, 2011).

Table 9
TE Consolidated Revenues Growth at Current and Constant Prices (2002–2010).

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Revenue in LE million	6219	7177	7749	8548	9517	9993	10,117	9960	10,218
Growth rate	–	15.4%	8.0%	10.3%	11.3%	5.0%	1.2%	−1.6%	2.6%
Real revenue 2010 = 100	13,131	14,500	14,070	14,800	15,307	14,307	12,581	11,082	10,218
Growth rate at constant prices	–	10.43%	−2.97%	5.19%	3.43%	−3.95%	−14.43%	−11.91%	−7.8%

Source: Telecom Egypt EAS Financial Summary, 2011. Note: Values converted from nominal to real using CPI from World Development Indicators (2012).

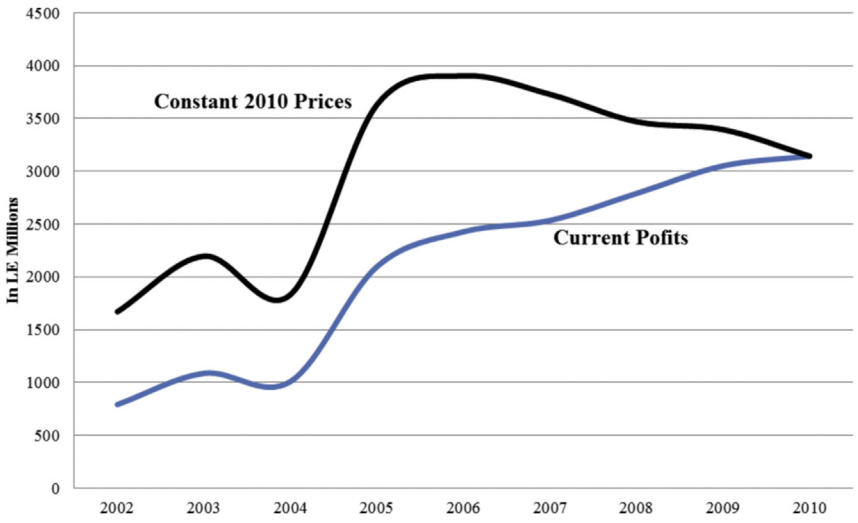

Fig. 29. TE's profits at current and constant prices (2002–2010). Source: Telecom Egypt EAS Financial Summary, 2011. Note: Values converted from nominal to real using CPI from World Development Indicators (2012).

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Table 10
TE Financial Highlights (in LE millions 2002–2011).

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Revenue in LE million	6219	7177	7749	8548	9517	9993	10,117	9960	10,218	9895
Growth rate of Revenues	–	13.35%	7.38%	9.35%	10.18%	4.76%	1.23%	−1.58%	2.52%	−3.26%
(2009 = 100)	11,801	13,032	12,645	13,301	13,758	13,214	11,307	9960	9183	
Growth rate of Revenues (2009 = 100)		10.43%	−2.97%	5.19%	3.43%	−3.95%	−14.43%	−11.91%	−7.8%	
Gross Profit	4286	5022	5324	5664	6421	6687	6752	6691	6976	6547
2009 = 100	8133	9119	8688	8814	9282	8843	7546	6691	6270	
Gross Profit % Margin	68.92%	69.97%	68.71%	66.26%	67.47%	66.92%	66.74%	67.18%	68.27%	66.16%
EBITDA Before Provisions	3737	4426	4621	4594	5277	5389	5163	5048	4663	4551
(2009 = 100)	7091	8037	7541	7149	7628	7126	5770	5048	4191	
EBITDA % Margin	60.09%	61.67%	59.63%	53.74%	55.45%	53.93%	51.03%	50.68%	45.64%	
EBIT	1042	1501	1977	2528	3376	3667	3505	3515	3411	3079
2009 = 100	1977	2725	3226	3934	4880	4849	3917	3515	3066	
EBIT % Margin	16.76%	20.91%	25.51%	29.57%	35.47%	36.70%	34.64%	35.29%	33.38%	31.12%
Net Profit before tax & Minority Interest	791	1087	1419	2533	2898	3054	3308	3510	3637	3496
2009 = 100	1501	1974	2316	3942	4189	4038	3697	3510	3269	
Net Profit before tax & Minority Interest % Margin	12.72%	15.15%	18.31%	29.63%	30.45%	30.56%	32.70%	35.24%	35.59%	35.33%
Profit for the Year in LE millions (after Tax & Minority Interest)	791	1087	1009	2097	2427	2534	2790	3051	3143	2929
(2009 = 100)	1501	1974	1647	3263	3508	3351	3118	3051	2825	
Profit Margin	12.72%	15.15%	13.02%	24.53%	25.50%	25.36%	27.58%	30.63%	30.76%	

Source: Telecom Egypt EAS financial summary various issues available at http://ir.telecomegypt.com.eg/EAS%20Financial%20summary.asp.

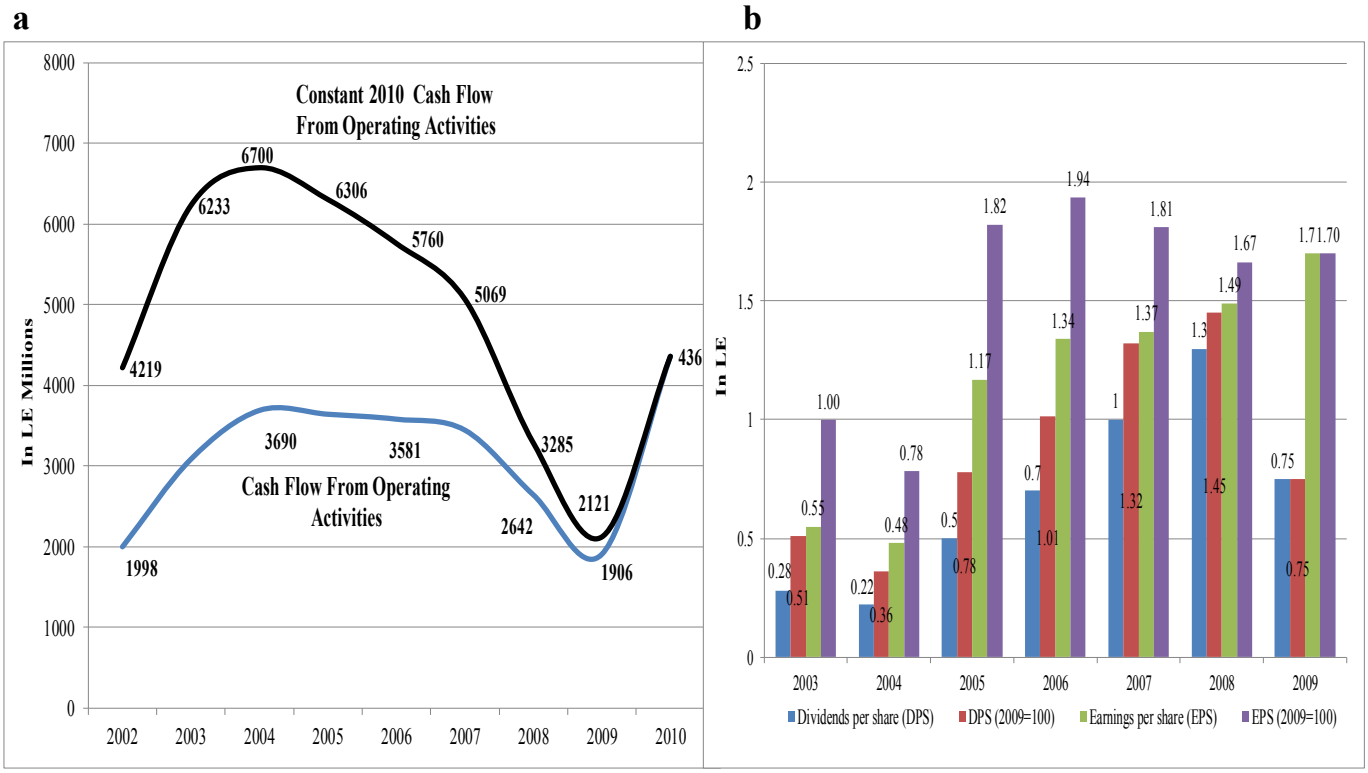

Fig. 30. TE Financial Indicators. a: Telecom Operating Cash Flow (2002–2010). b: Telecom Egypt Return Calculation (2003–2009). Source (a): Telecom Egypt EAS Financial Summary, 2011, Note: Values converted from nominal to real using CPI from World Development Indicators (2012). (b): Telecom Egypt annual report, 2009. Available at http://ir.telecomegypt.com.eg/Annual%20Reports.asp.

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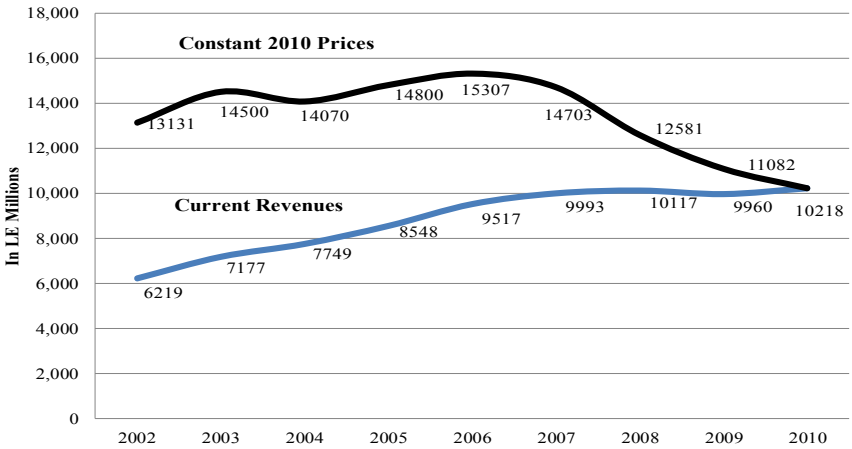

Fig. 31. TE's consolidated revenues at current and constant prices (2002–2010). Source: Telecom Egypt EAS Financial Summary, 2011. Note: Values converted from nominal to real using CPI from World Development Indicators (2012).

Table 11
Evolution of International Market Shares and Concentration Levels. (Overall market (with TE & Vodafone combined), in thousands of outgoing minutes, share in %, 1997; 2003–2009).

	Mobinil	Etisalat	Other	TE & Vodafone	Total Minutes	Concentration Indices		
						HHI	CR1	CR2
1997	0	0	0	N/A		1	100%	
	0	0	0	100%				
Oct-Dec 2003	25,614	0	11,563	48,562	85,740	0.43	57%	87%
	30%	0%	13%	57%	100%			
2004	129,420	0	49,036	219,017	397,474	0.43	55%	88%
	33%	0%	12%	55%	100%			
2005	140,344	0	54,475	249,967	444,786	0.43	56%	88%
	32%	0%	12%	56%	100%			
2006	156,796	0	53,570	286,603	496,970	0.45	58%	90%
	32%	0%	11%	58%	100%			
2007	192,755	981	44,415	338,565	576,715	0.46	59%	92%
	33%	0.17%	8%	59%	100%			
2008	200,213	82	34,005	364,939	599,239	0.48	61%	94%
	33%	0.01%	6%	61%	100%			
Jan-Aug2009	120,566	102	11,946	231,526	364,139	0.51	64%	97%
	33%	0.03%	3%	64%	100%			

Source: Numbers of minutes: MCIT Database, 2010. Market share, HHI, CR1, CR2: Calculated from MCIT Database.
Note:*Concentration Ratio (CR_n) is the market share of the top n firms in the industry; here we calculate the share of the top firm (CR_1) and the top two firms (CR_2) in the market.
*The Herfindahl-Hirschman Index (HHI) is calculated as the sum of squares of market shares.
HHI $= \sum_{i=1}^{N} S_i^2$, where.
1) i is the ith firm of the industry where i = 1 … N.
2) N=# of firms in the industry.
3) Extreme cases: in perfect competition HHI = 0, in pure monopoly HHI = 1; and so $0 \leq HH \leq 1$.

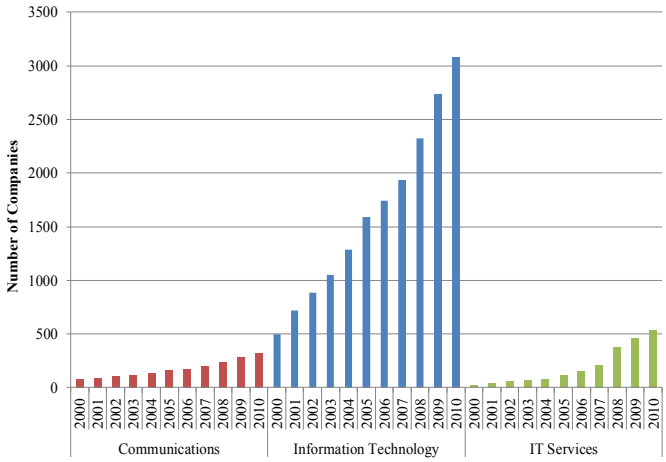

Fig. 32. Evolution of numbers of firms in the ICT sector (2000–2010). Source: ICT Indicators Portal, 2012.

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Table 12
Evolution of Market Shares and Concentration Levels (Overall Market (with TE & Vodafone combined)) (Subscribers in thousands, share in %, 1997–2011).

	Mobinil	Etisalat	TE & Vodafone	Total Subscribers	Concentration Indices		
					HHI	CR_1	CR_2
1997	0	0	3453	3453	1	100%	
	0	0	100%	100%			
1998	158	0	4009	4167	0.93	96%	100%
	4%	0	96%	100%			
1999	576	0	5463	6039	0.83	90%	100%
	10%	0	90%	100%			
2000	1218	0	6868	8086	0.74	85%	100%
	15%	0	85%	100%			
2001	1851	0	8296	10,147	0.70	82%	100%
	18%	0	82%	100%			
2002	2352	0	9879	12,231	0.69	81%	100%
	19%	0	81%	100%			
2003	3057	0	11,476	14,534	0.67	79%	100%
	21%	0	79%	100%			
2004	4074	0	13,033	17,107	0.64	76%	100%
	24%	0	76%	100%			
2005	7505	0	16,521	24,026	0.57	69%	100%
	31%	0	69%	100%			
2006	9267	0	19,542	28,809	0.56	68%	100%
	32%	0%	68%	100%			
2007	15,089	1643	24,562	41,294	0.49	59%	96%
	37%	4%	59%	100%			
2008	20,101	3560	29,464	53,125	0.46	55%	93%
	38%	7%	55%	100%			
2009	25,354	6673	33,638	65,665	0.42	51%	90%
	39%	10%	51%	100%			
2010	30,225	8648	41,406	80,279	0.42	52%	90%
	38%	11%	52%	100%			
2011	32,914	13,849	45,377	92,139	0.39	49%	85%
	36%	15%	49%	100%			

Source: Numbers of subscribers: Egyptian Ministry of Communication and Information Technology (MCIT), 2012, Market share, HHI, CR_1, CR_2: calculated from MCIT Database
Note:*Concentration Ratio (CR_n) is the market share of the top n firms in the industry; here we calculate the share of the top firm (CR_1) and the top two firms (CR_2) in the market.
*The Herfindahl-Hirschman Index (HHI) is calculated as the sum of squares of market shares.
$HHI = \sum_{i=1}^{N} S_i^2$, where.
1) i is the ith firm of the industry where i = 1 … N; 2) N = # of firms in the industry.
3) Extreme cases: in perfect competition HHI = 0, in pure monopoly HHI = 1; and so $0 \leq HH \leq 1$.

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[56] Identity of interviewee cannot be disclosed for confidentiality.

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