

**The Cellular Divide: A comparative analysis of mobile phone usage in
Spain and the United States**

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Abstract

The usage of mobile phones has dramatically increased in the past decade, narrowing the boundaries of size, space, and time. It is this “death of distance” that will be the single most important economic force shaping all of society over the next half century. The economic prosperity of the United States has contributed to the increase in this “luxury” telecommunication device, but how can the rapid increase in European countries with lower per capita incomes such as Spain be explained?

The purpose of this paper is to examine mobile phone usage and penetration rates in the United States compared to Spain. This research question will be addressed by analyzing determinants of supply and demand in the market structures of each country. An emphasis will be placed upon differing pricing structures within the two countries. Explanatory demand related factors include the availability and prices of substitutes and complements, and tastes and preferences. Supply-side variables include the impact of regulation and technology.

The paper concludes that an important reason behind the rapid growth in cellular mobile penetration that Spain recently experienced is due to the introduction of pre-paid pricing schemes in a country with a Calling Party Pays (CPP) pricing structure, coupled with the relative effects of the determinants of demand and supply in each mobile communications market.

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I. Introduction

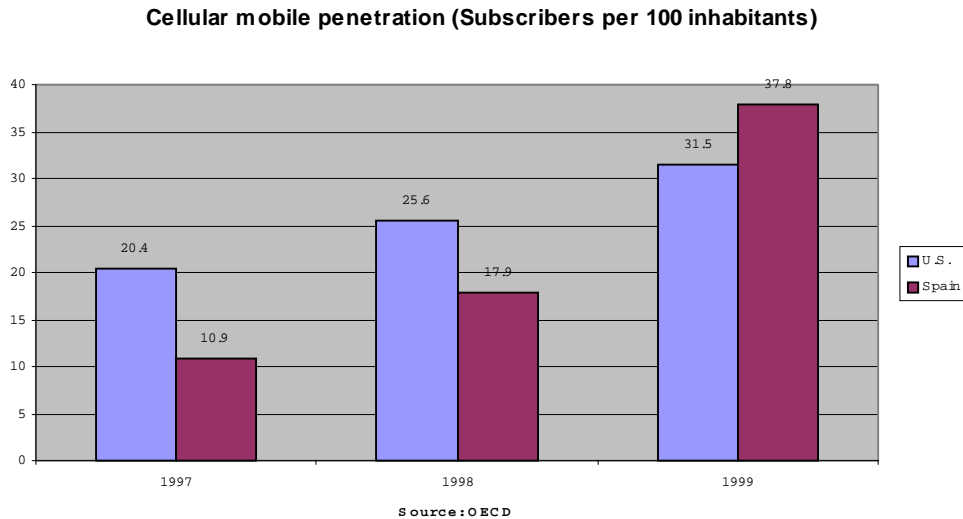
An international business deal is made in route to a child's baseball game, a woman informs her friends of a change in plans, a victim reaches assistance in a time of desperation. The introduction of the cellular phone has not only changed the lives of individuals, but the future of telecommunications as a whole. In the telecommunications revolution, the growth of the wireless communication sector will narrow boundaries of size, space, and time. It is this "death of distance" that will be the single most important economic force shaping all of society over the next half century (Carnicross).

The usage of cellular phones has dramatically increased in the past decade. According to the Organization for Economic Co-operation and Development, there were about 293 million mobile subscribers in the OECD area by June 1999, equating to around one mobile phone for every four inhabitants (OECD, 2000a, 6). The economic prosperity of the United States has contributed to the increase in this "luxury" telecommunication device, but how can the rapid increase in European countries with lower per capita incomes such as Spain be explained? Currently, 45 percent of U.S. citizens carry mobile phones, in comparison to 70 percent of Europeans (Guerrero, 2001).

Figure 1 depicts how cellular mobile penetration, which is measured by subscribers per 100 inhabitants, has increased more rapidly in Spain than in the United States in the past few years. From 1998 to 1999, subscribers per 100 inhabitants more than doubled in Spain from 17.9 to 37.8, while in the United States the figure only increased by less than 24%. Prior to 1999, cellular mobile penetration was higher in the United States, but currently Spain boasts a higher subscriber to 100 inhabitants ratio.

What changes in the market structures in both countries facilitated this dramatic increase in subscribership?

Figure 1



The purpose of this paper is to examine cellular phone usage in the U.S. compared to Spain. Spain was chosen because it is the fifth largest telecommunications market in Europe and operates in accordance to European Union directives. This research question will be addressed by analyzing determinants of supply and demand in the market structures of each country. An emphasis will be placed upon differing pricing structures within the two countries. Explanatory demand related factors will include the availability and prices of substitutes and complements, and tastes and preferences. Supply-side variables will include the impact of regulation and technology.

II. Theoretical Framework

Cellular mobile penetration rates will be examined by applying the laws of supply and demand to the market structures of each country. First, the known determinants of supply and demand will be addressed in regard to the mobile communications market. In addition, it will be proposed that a change in the pricing schemes in Spain to pre-paid plans caused shifts in the demand curve.

Determinants of demand & supply

The market structure for the mobile phone industry in both the United States and Spain can be broken down and analyzed by evaluating the determinants of demand and supply that affect the position of the curves. From the intersection of the two curves, the equilibrium number of subscribers in terms of cellular penetration can be determined. Therefore, it is possible to use supply and demand concepts to predict mobile phone usage in both Spain and the United States.

The determinants of demand include income and wealth, the price of related goods, population, expectations, and tastes. A change in any of the stated determinants will cause the demand curve to shift. In relation to the market for mobile communications, determinants of demand that will be addressed are the availability and prices of substitutes including fixed-line service and the Internet, the prices and availability of complements such as short message service (SMS), tastes and preferences.

The determinants of supply affecting the mobile markets will include the impact of regulation and technological advancements.

Pricing schemes as demand determinants

In traditional supply and demand analysis, a change in the price of the good or service being analyzed will not cause a shift in the position of the demand curve, but a movement along the curve itself. However, when a pricing scheme changes in favor of consumers, the entire demand curve could shift to the right. In regard to the mobile communications market, it will be argued that the introduction of pre-paid pricing schemes in Spain caused a shift in the demand curve for mobile service.

III. Application of theory to mobile communications market

Determinants of mobile communications demand

In the mobile telecommunications markets in both Spain and United States, determinants of demand include the availability and prices of substitutes and complements, and tastes and preferences. Each determinant will be analyzed by how it affects the relative positions of the demand curves in the markets.

Tastes and preferences

A change in consumer tastes and preferences can cause a shift in demand. For example, the important role that mobile phones played during the terrorist attacks on the United States on September 11, 2001 caused a change in the preference of consumers. Consumer tastes changed in favor of the service. Applying demand theory, this change in taste would cause the demand to increase for the wireless service, and thus the demand curve would shift to the right in the market. In support of the theory, three of the United States' largest cellular phone companies reported increases in their number of subscribers that they attributed to the role that cellular phones played for victims of the airliner

hijackings (Guerrero, 2001). An increase in the number of subscribers can be attributed to an increase in the demand for cellular phones. The repercussions of the terrorist attacks not only affected preferences in the United States, but also were felt around the world. Statistics from the Cellular Telecommunications Industry Association (CTIA) state that safety is the #2 reason people give for buying wireless service. In 1997, more than 59,000 calls were made to 9-1-1 or other emergency services every day by wireless phone users and the frequency of mobile phone usage in emergency situations has been on the rise. In these uncertain times, the need for services that offer safety assurances is great, and will result in an increase in demand for mobile phones around the world, including the United States and Spain.

The increase in demand for services that can provide security and potential protection is not the only manner in which consumer preferences can change in relation to wireless communications. Tastes can also be influenced by increased information about mobile providers and services. An increase in information provided about wireless services and providers can stem from massive advertising campaigns. Prime Co, a United States wireless provider, uses a pink alien in its commercials to establish brand recognition while the Spanish provider, Telefonica Movistar, utilizes billboard advertisements. This increase in mass advertising will cause consumers' demand for wireless services to increase as well.

The availability and prices of substitutes & complements

Fixed-line services

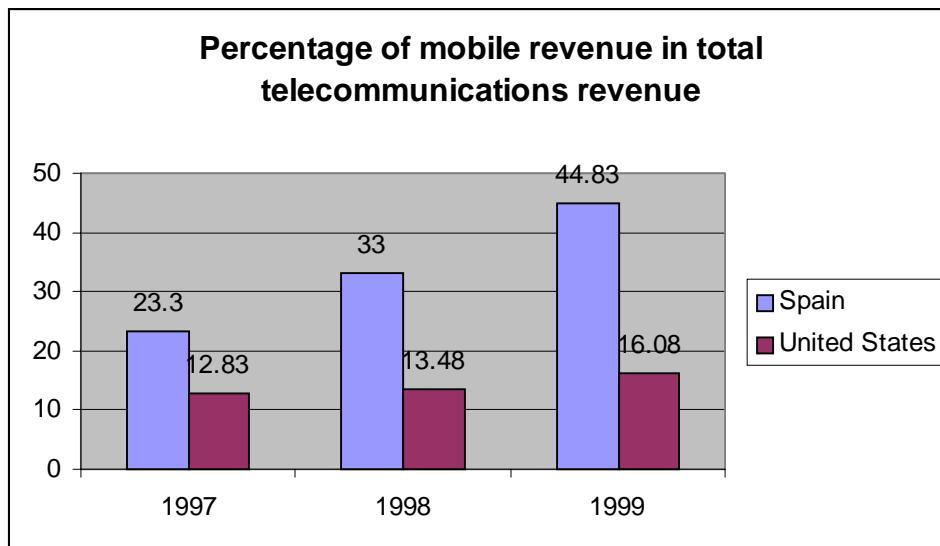
Mobile phone services can either act as substitutes or complements to fixed-line services. Mobile phone services were originally introduced as complements to fixed-line

phones, but this has changed due to differences in the fixed-line telecommunications market in various countries.

Figure 2 depicts the mobile revenue as a percentage of total telecommunications revenue. Mobile revenue makes up a much larger percentage in Spain compared to the United States. Also, the growth in the percentages in Spain is high while in the United States it is quite steady.

These figures suggest that mobile phone users in Spain may view mobile phones as a stronger substitute to fixed-line services than mobile users in the United States. An important reason for this could stem from differences in two countries' pricing structures. In Spain, no flat rate unlimited calling plans for fixed-line services exist and households pay on a per minute basis. Both fixed-line service and mobile phone service in Spain are priced on a per minute basis, making the services closer substitutes. For example, if the price of mobile service decreases, as has been the recent trend, more Spaniards will be willing to substitute mobile phone usage for their fixed-line phone usage.

Figure 2



Source: OECD

In contrast, fixed-line providers in the United States offer an array of calling plans, including flat rate plans such as unlimited monthly usage. For example, SBC/Ameritech offers a local unlimited package providing Illinois customers in access area A with a phone line and unlimited local calling for one low monthly charge of only \$15.08. Because of the low cost unlimited calling plan, if the price of mobile phone usage decreases in the United States, consumers will not abandon their local fixed-service but may marginally increase their mobile phone usage.

Due to the differences in pricing structures discussed above, fixed-line services are a stronger substitute to mobile services in Spain than in the United States. Therefore, if the relative price of mobile services compared to fixed-line services is decreasing in both countries, the demand for mobile service will increase more in Spain than in the United States.

Internet

Like fixed-line services, the Internet can be viewed as a substitute for cellular phone services because it provides electronic mail and voice communications. As a substitute, the increase in the availability of the Internet and the decrease in the price of Internet service may cause a decrease in demand for cellular phones. The decrease in demand for cellular services would be larger in the United States compared to Spain because the growth of Internet use is much greater in the United States.

Data taken from an edition of London's *Economist* states that Internet usage in Spain increased by 4% from January 1996 to February 1997, while the increase in the United States was by more than 38% (Carnicross, 262). There is an obvious American dominance in Internet usage that can be attributed to the fact that its early development

took place almost entirely in the United States and that a large majority of sites are in English. Also, fixed-line telephone services in Spain do not offer flat rate unlimited monthly calling plans like providers in the United States. Internet usage is unattractive to Spaniards that are forced to pay a per minute rate for their Internet connections, while it is very attractive in the United States because providers such as SBC/Ameritech offer flat rate unlimited calling plans and high speed services such as DSL. Due to the fact that the availability and usage of the Internet is greater in the United States than in Spain, the increase in demand for this substitute will decrease the demand for cellular services more in the United States.

Short Message Service (SMS)

The Short Message Services (SMS) offers users the ability to send text messages to and from mobile phones and acts as a complement to mobile phone usage. SMS has become increasingly popular over the years, especially in European countries. This increase in popularity can be attributed to advancements in technology, the introduction of pre-paid cards, the increase of electronic commerce, and varying prices for SMS.

In regard to technological advancements, mobile phones now have the capability to receive messages such as stock market quotes and also send text messages. Due to this advancement, growth in the usage of SMS has increased and is now a substitute for paging. SMS is also preferable than voice calls in certain situations. For example, SMS is more useful as a means of privacy and in locations where it is difficult to hear a voice conversation.

SMS pricing varies greatly between Europe and the United States. The average price to send a SMS message in the European Union is \$.16 with no fixed fee, while the

United States providers charge between \$.01 and \$.06 per call with a fixed charge of around \$5 per month. Another difference in pricing involves pre-paid calling plans. The introduction of pre-paid calling options for mobile service has increased SMS traffic. Pre-paid plans allow users to choose between both voice and SMS services. In a report from the OECD, one analyst stated that “an increase in SMS traffic of 100% is not unusual when SMS for prepay is introduced” (OECD, 2000a, 64).

The availability of pre-paid plans attracts younger users that are more adept at learning new technologies and will likely take advantage of SMS. Since the growth in pre-paid plans is much greater in Spain than the United States, the growth in SMS will also be greater. In Spain, Telefonica reports that SMS has undergone rapid growth and the level of SMS in 2000 represents more than three times the level of the first half of 1998 (OECD, 2000a, 12).

SMS acts as a complement to mobile phone service so that an increase in the demand for SMS will cause an increase in the demand for mobile phones. This increase will be larger in Spain than the U.S. due to the rapid growth in the popularity of pre-paid options in Spain, as well as different pricing structures involving fixed monthly charges for SMS in the United States.

Determinants of mobile communications supply

The determinants of supply that will be addressed regarding the mobile communications market are the impact of regulation and technological advancements. The regulatory environments in Spain and the United States differ based upon spectrum allocation and market openness.

Impact of Regulation

The regulatory issue arising from the mobile telecommunications market is spectrum scarcity. Spectrum rights must be properly allocated by regulators to ensure efficiency and growth in the sector. The mobile communications markets in Spain and the United States differ based upon their number of operators and the regulatory environments.

In the United States, cellular service began as a government-licensed duopoly with licenses extending over metropolitan areas and later to rural service areas. The Federal Communications Commission (FCC) accomplished this by identifying 115 MHz of spectrum that it transferred to mobile uses. Prior to the transfer, the spectrum had been allotted for UHF television broadcasting but had been unused for decades. At first a large number of independent operators owned the licenses, but mergers and acquisitions soon led to consolidation within the industry. By 1993, the ten largest companies accounted for more than 80 percent of total cellular subscribers (Crandall/Waverman, 23). As subscribers increased, new technologies such as TDMA and CDMA were developed to increase the capacity of the existing spectrum. In 1992, a new cellular company, Fleet Call was allowed by the FCC to enter the market by purchasing special mobile radio licenses and converting them to cellular use. This new competitor was allowed to enter because it offered to make better use of the spectrum than what the FCC had originally envisioned. Through technological advancement came another type of mobile communication, the Personal Communications System (PCS). PCS is entirely digital and incurred a high development cost.

Currently, commercial networks for mobile communication are divided into two categories: cellular and PCS. The difference between the networks is distinguished by the frequencies that they utilize. In the United States, cellular utilizes the 800 MHz band while PCS utilizes the 1900 MHz band. Cellular services represent the larger segment of wireless communications, but the gap between the two is closing quickly due to advances in technology.

Licenses for PCS stating exclusive rights for a particular slice of spectrum over a geographic area must be obtained through a government auction. The auction is multi-round and large sets of related licenses are auctioned simultaneously. A bidder can bid on any license being offered and the auction does not close until bidding has ceased on all licenses (Cramton 57). In 1998, the United States had 976 mobile service providers (OECD, 2001, 228)

Spain has the same technology, but due to the regulatory environment, only had 4 wireless providers in 1999 (OECD, 2000b, 169). The awarding of licenses in Spain presents the regulatory issue if the spectrum licenses should be awarded by “beauty contest” or by auctions such as in the United States. A “beauty contest” describes how judgments to grant licenses are based on criteria such as the bidder’s coverage plans, views on roaming onto rival third generation networks, and the subsidization of networks in areas of low population density (OECD, 2000b, 73). France currently uses “beauty contests” to allocate its spectrum. In March 2000, Spain awarded 4 licenses by a competition that was not an auction. An auction would have been preferable because it “permits licensees, not regulators, to formulate business and marketing plans” (OECD,

2000b, 171). The mobile markets in Spain and the United States differ due to the regulatory process.

Table 1 contains data on the commencement date, subscribership, and percentage of market share for Spanish mobile operators. Telefonica introduced its Moviline products in 1990 but the mobile market did not open for competition until 1995. In Spain there were only four providers of mobile services in 1999 while the United States boasted over 976 operators in 1998.

Table 1: Mobile provider data in Spain

Company	Commencement date	# subscribers (Jan. 1999)	% market share
<i>Telefonica Moviline</i> (analogue TACS 900 system)	April 1990	880,000	Telefonica ≅ 70%
<i>Telefonica Movistar</i> (GSM 900)	July 1995	4,400,000	
<i>Airtel</i> (GSM 900)	October 1995	2,300,000	≅ 30%
<i>Retevision Movil</i> ("Amena" DCS-1800)	January 1999	5,000	< 1%

Source: OECD, "Regulatory Reform in Spain", 2000b

Analysis by the OECD "clearly shows a strong correlation between market growth and market openness." Due to this, it can be suggested that since the mobile communications market is more open in the United States compared to Spain, an increase in the number of operators will increase the supply of mobile services more in the United States than Spain.

Technological advancements will also increase the supply in the mobile communications market. Technologies that allow for more efficient use of scarce spectrum space will decrease the price of inputs and thus increase the supply in the mobile communications market. Growth in mobile technology is similar in both Spain and the United States and will cause supply to increase in both markets.

IV. Application of supply & demand analysis

The determinants of demand and supply analyzed in the previous section will cause shifts in the curves in both mobile telecommunications markets. Table 2 describes the various determinants and how they will affect the relative position of the curves in the mobile communications market in Spain and the United States. In the first part of the analysis, only traditional supply and demand determinants will be considered. In regard to demand, the increase will be greater in Spain than in the United States. In terms of the supply curve, it will increase more in the United States compared to Spain due to differences in the regulatory environment. Arguments supporting these conclusions are developed in Section IV. Section V will then apply further analysis by introducing pricing scheme concerns.

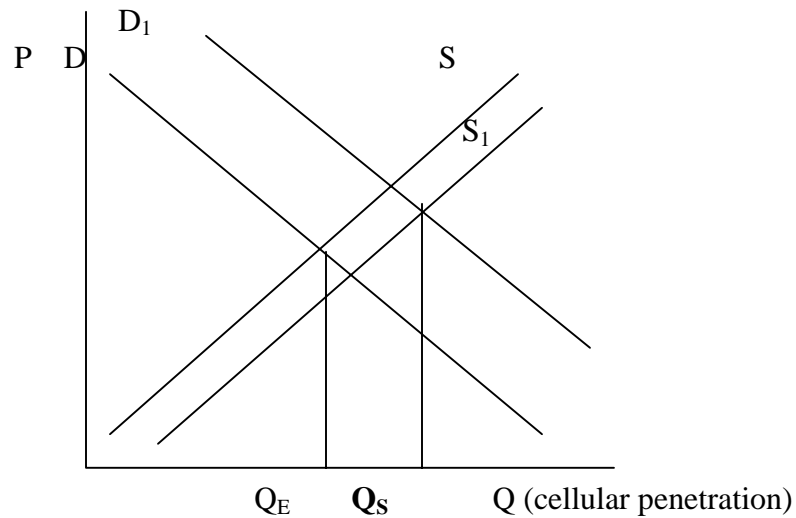
Table 2: Relative effects of increases in determinants of demand & supply on mobile communications markets

Determinants of demand:	United States	Spain
Tastes & preferences	Increase	Increase

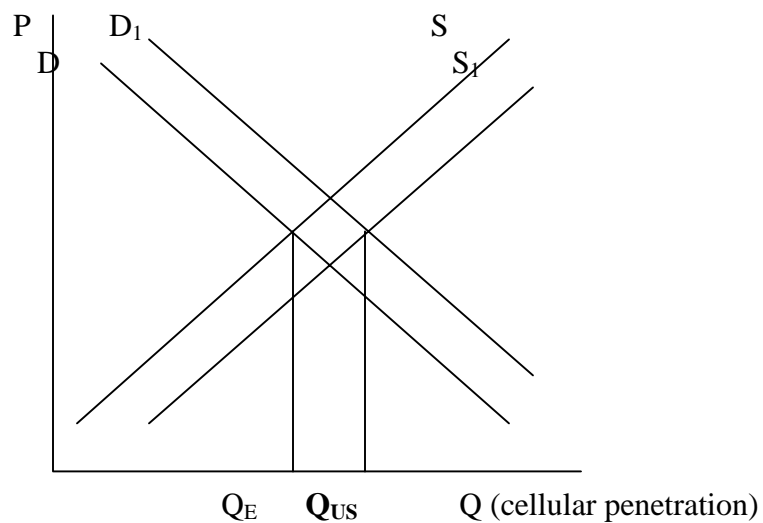
Substitutes: Fixed-line service Internet	Increase (smaller) Decrease (larger)	Increase (greater) Decrease (smaller)
Complements: SMS	Increase (smaller)	Increase (larger)
<i>Magnitude of shift</i>	<i>Increase (smaller)</i>	<i>Increase (larger)</i>
Determinants of supply:		
Impact of regulation	Increase (greater)	Increase (smaller)
Technological advancements	Increase	Increase
<i>Magnitude of shift</i>	<i>Increase (greater)</i>	<i>Increase (smaller)</i>

Figure 3 represents the above data graphically. In order to analyze the relative effects of the determinants of demand and supply, each market is placed at an equilibrium point where the quantity of subscribers in terms of mobile penetration in Spain is equal to that of the United States. It is from this common equilibrium point that the curves then are altered based upon the relative magnitudes of the shifts in demand and supply. The end result after the relative shifts occurred is that the quantity of subscribers is only slightly greater in Spain compared to the United States. This does not help to explain why cellular mobile penetration doubled in Spain between 1998 and 1999 while it only increased by less than 24% in the United States (Figure 1). This evidence suggests that there may be other factors that affect the mobile communications markets. These factors will be addressed in the following section.

Figure 3: Graphical analysis of mobile phone markets



Spain mobile communications market



United States mobile communications market

V. Pricing schemes as demand determinants

It will be argued that the introduction of prepaid pricing schemes in Spain coupled with the effects of the Calling Party Pays (CPP) pricing structure caused a shift in the

demand for cellular service. In traditional supply and demand analysis, a change in the price of a good or service will not cause a change in demand, but a movement along the demand curve itself. This section will provide a discussion of the differences and effects of the Calling Party Pays (CPP) and Receiving Party Pays (RPP) pricing structures and the introduction of prepaid pricing schemes in Spain.

CPP vs. RPP

Most countries in the OECD area, including Spain, utilize the pricing structure known as calling party pays (CPP). In this structure the calling party pays the entire cost of the call regardless if the call is from a fixed network or mobile user. This structure, however, is not predominant in the United States. The U.S. instead utilizes the receiving party pays structure. In this pricing structure the receiving party directly contributes to the cost of each call by sharing that cost with the calling party. The cost for each party differs in respect to being a call from mobile-to-mobile versus a call from fixed to mobile networks.

Table 3 illustrates RPP pricing structures based upon each type of call. Regarding the calls from mobile-to-mobile, the price of airtime on the originating network equals the price of airtime on the receiving network and each user is billed. In calls from a mobile to a fixed network, the total cost of the call is incurred by the mobile user while the fixed network customer is not charged. Finally, in calls from a fixed to a mobile network, the mobile user is charged for the call and the fixed network customer is charged the standard local call rate. In countries such as the United States, the majority of fixed network providers offer unmeasured local service and therefore, the fixed user would incur no direct charge per call.

Table 3: RPP Pricing Structures

Call type	Party costs	Total charge for call
2 mobile users on same network	CP: \$.30 RP: \$.30	\$.60
2 mobile users on different networks	CP: \$.30 RP: \$.30	\$.60
Mobile to fixed network	CP: \$.30 RP: \$ 0	\$.30
Fixed to mobile network	CP: \$.0 RP: \$.30	\$.30

Source: OECD, 2000a, 35.

Assumes price of a one-minute call to and from a mobile network is \$.30.

In countries such as the United States with the RPP pricing structure, mobile phone users will be less willing to give their mobile number to individuals than in Spain. This is due to the fact that mobile phone users in the U.S. will be charged for incoming calls while those in Spain will not incur charges. This difference in pricing structures has a great impact regarding the introduction of prepaid pricing schemes.

Pre-paid plans

A major innovation in the pricing of cellular mobile services has been the introduction of pre-paid cards. Pre-paid cards allow subscribers to pay in advance for wireless service without receiving a monthly bill and offer many benefits. First, cellular phone users have greater control over their expenditures for service because they purchase minutes of airtime in advance and can “recharge” their minutes at any time. Mobile operators also benefit from lower customer acquisition and billing costs. Finally, pre-paid plans allow operators to take advantage of a previously untapped market

segments including individuals with insufficient credit ratings and children. In Spain, Telefonica's group of pre-paid options was the main driver of growth due to its popularity with young Spaniards (OECD, 2000a, 11). These plans appeal to parents because they can place a cap on the cost of providing their children with mobile phone service, and at the same time secure their children's access to emergency numbers.

Pre-paid pricing schemes were introduced in Spain in 1997 but mobile operators in the United States did not begin to market prepaid services until much later. In the United States, the "FCC noted a trend towards the design of packages to increase subscribers' minutes of use" (OECD, 2001, 237). Increasing the amount of minutes that subscribers use is more easily accomplished with post-paid than with pre-paid plans. The emphasis on increasing minutes of use has negatively affected the growth in mobile penetration in the United States compared to Spain.

Effects of Spain's pre-paid pricing scheme

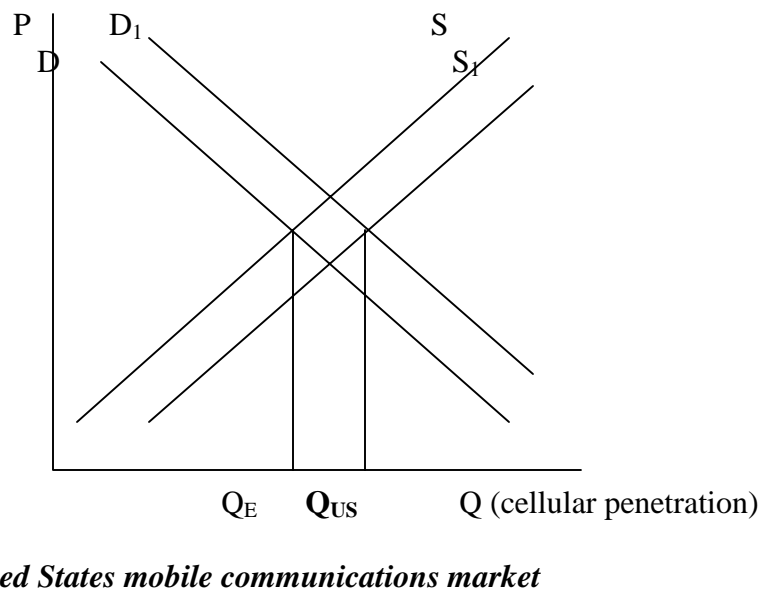
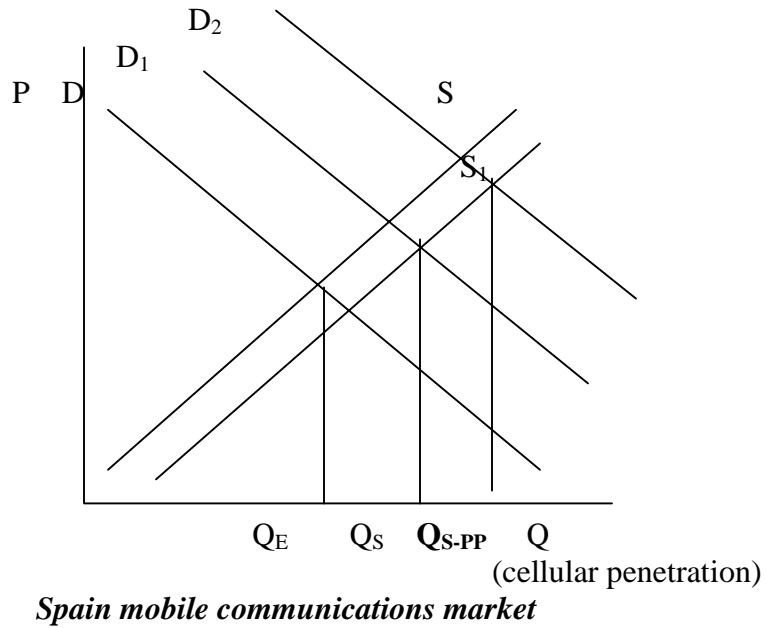
From Figure 1 depicting the cellular mobile penetration rates in Spain compared to the United States, it is obvious that a change occurred between 1998 and 1999 to spurn rapid growth in subscribership in Spain, thus overtaking the penetration rate in the United States. "Using the ratio of mobile subscribers to fixed access lines, to make allowances for other factors such as GDP per capita, the advent of pre-paid cards strongly correlates with countries with CPP overtaking the growth rates for those with RPP" (OECD, 2000a, 11).

An important change that occurred in the mobile communications market in Spain was the strong emphasis on pre-paid pricing plans. The introduction of prepaid calling schemes in Spain can be viewed as a natural experiment because a change in policy

occurred without dramatic changes in other determinants of supply and demand such as technology, the regulatory environment, and tastes and preferences.

Figure 4 represents the effect that a change in the pricing scheme for mobile service had on the mobile communications market in Spain. When a pricing scheme changes in favor of consumers, the entire demand curve in the mobile communications market can shift to the right. The demand curve in Spain would increase while demand in the United States would remain unchanged due to growth spurred by the popularity of pre-paid pricing schemes in countries such as Spain with CPP pricing structures. If the demand curve in Spain increases by shifting further to the right, this will yield a new equilibrium point in Spain's mobile communication market. At this equilibrium point, the number of mobile subscribers will increase and this new quantity will be significantly greater than the equilibrium quantity in the United States' mobile communications market. It is the introduction of pre-paid plans in a country such as Spain with a CPP pricing structure coupled with the relative effects of the determinants of demand and supply in each mobile communications market that suggest why cellular mobile penetration is greater in Spain compared to the United States that boasts a significantly greater GDP per capita. The above mentioned differences in the two market structures yield policy implications.

Figure 4: Graphical analysis of mobile phone markets with the introduction of pre-paid pricing schemes in Spain



VI. Policy Implications & Conclusions

The purpose of this paper was to examine why mobile phone usage increased faster in Spain in recent years compared to the United States. Upon applying the theory of supply and demand to the mobile communications market structures in both countries, conclusions can be drawn to explain important reasons behind their differing growth rates in cellular mobile penetration.

In regard to traditional determinant analysis, each demand-side factor including tastes and preferences and the price and availability of substitutes and complements, pointed toward more rapid growth in Spain compared to the United States. On the supply-side, the impact that regulation had on the markets caused a greater increase in supply in the United States compared to Spain. These above conclusions result in a slightly larger equilibrium quantity of mobile penetration in Spain than in the United States (refer to Figure 3), but do not explain Spain's current rapid growth. The most important conclusion of this paper is that the introduction of pre-paid pricing schemes coupled with the CPP pricing structure caused a favorable shift in demand in Spain, as opposed to a movement along the demand curve. When this factor is considered with the results of traditional supply and demand analysis, it reinforces the conclusion that demand in the mobile communications market increased greater in Spain, thus yielding a greater equilibrium quantity of mobile penetration (refer to Figure 4).

The policy implications stemming from this analysis suggest that Spain needs to re-examine the supply-side factor of the impact of regulation and the United States must review pricing schemes that effect the demand side of its mobile communications market.

According to the U.S. Industry & Trade Outlook, the FCC is currently reexamining the impact of the practice that the calling party pays (CPP). In order to spur growth, the mobile communications market in the United States must alter its pricing structure to tap into other markets of mobile phone users such as young adults. It can achieve this by moving away from the RPP pricing structure and marketing pre-paid plans. Spain, though recently experiencing rapid growth within the mobile communication market, must consider the benefit of establishing auctions for allocation of scarce spectrum space and tradable rights within in the spectrum. The OECD states that there is a strong correlation between market growth and market openness. In order to influence growth the mobile communications market, Spain must move away from distributing spectrum space by a “beauty contest” method, and turn to open auctions as a more efficient method of allocation.

It is essential for countries to invest in the design and implementation of infrastructures. The ability to communicate quickly and efficiently is necessary to spurn economic growth. Future trends in wireless communication promise the invention of new technologies that will possess the ability for providers to pinpoint their phones within 100 yards making it easier to locate the origin of 911 calls. Whether an individual is looking for safety, status, or service, wireless communication is the answer and both the United States and Spain need to take regulatory measures to invest in its infrastructure to ensure they do not get lost in the “cellular divide.

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