The Impact of New Information Technologies on the Commercial Brokerage Industry

Phase I: What Is at Stake?
Estimation of the Revenue Flow to the Office and Industrial Brokerage Sectors [a]

Report for the Society of Office and Industrial REALTORS® Educational Foundation
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Dedicated to Education and Research
for the Commercial Real Estate Industry

The SIOR Educational Foundation mission is to promote, sponsor, and support education and research initiatives that advance professionalism in the commercial real estate industry. Established more than 30 years ago to publish the industry's first graduate-level textbook on industrial real estate, SIOREF has maintained its dedication to expanding understanding of the commercial real estate industry.

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[a]This is the first of three reports to be provided. Phase II will document and analyze existing e-commerce initiatives in the commercial brokerage area. Phase III will conclude with how and why different facets of the brokerage business are likely to be impacted by information technology developments.

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are responsible for all errors and omissions.

Abstract

We estimate there are from $10.4-$13.3 billion in annual brokerage commissions on office and industrial properties. Our estimate is based on an underlying imputation of office and industrial sector size that relies on new data that constitutes a census of properties in major markets. This is important because estimation error is reduced the more one can rely on a census for the measure of market size. Previous estimates made before these data became available look to be subject to much greater estimation error. Our analysis concludes that there is over 7 billion square feet of office space nationally and nearly 23 billion square feet of industrial product. In aggregate, we conclude that about $185 billion in lease revenues are generated annually on this space.

Assuming the midpoint of $11.8 billion from the estimated range of gross commissions, we calculate that the present value of industry profits is in excess of $5 billion. This figure clearly is large enough to attract the attention of entrepreneurs using new information technologies to try to capture a portion of the value in this industry. The next two stages of this research will more carefully examine the nature of e-business operations in the commercial brokerage space and how they might influence the industrial organization of the commercial brokerage industry, the nature of brokerage firms, and compensation to brokers.

I. Introduction

The rapid rise of the Internet and technology company valuations may have made it seem as if they would quickly and radically impact information-sensitive industries such as commercial brokerage. The even more rapid recent decline of these on-line companies may make it seem as if there would be little fall-out for bricks and mortar brokerage companies. We urge caution with respect to any such extreme conclusion, as the vagaries of short-run capital markets mood swings make them relatively poor predictors of longer-run impacts.

In fact, there is sound theoretical basis in economics suggesting that e-commerce could materially impact the nature of firms in commercial brokerage as well as the sector=s industrial organization. One especially relevant insight is that if transactions costs fall substantially, there would be fewer transactions within firms and more transactions across firms.[1] In this scenario, firms become more specialized, buying things they need from other firms who are specializing in something else. Thus, an important question is whether e-commerce and other technological developments can materially lower the cost of leasing, selling, or managing a building.

Related work by Paul Milgrom and John Roberts published in their book A*Economics, Organization, and Management*@ provides additional insights into how the rise of cost-saving technologies might affect brokerage firms and the brokerage industry.[2] Their work focuses on process improvements afforded by technological advancements. For us, the question is how the Internet might

[1]See Ronald Coase, AThe Nature of the Firm@, *Economica*, Vol. 4 (1939): 386-405.

[2]See Paul Milgrom and John Roberts, *Economics, Organization, and Management*, Prentice Hall, 1992.

lead to different process improvements for the leasing, selling, and managing of space. More specifically, could the web be used to conduct transactions without a broker or a physical inspection of the property? The holy grail of many entrepreneurs is to cut costs by eliminating the middle man. However, economic history demonstrates that such intermediaries are very difficult to eliminate from the chain of business. In our case, brokers appear to be important repositories and conduits of information and knowledge that are not easily replaceable. Ultimately, the issue comes down to whether anyone, new or existing, can exploit new information technology to provide the repository of information and knowledge and be a flexible conduit of information – all more cheaply than can be done by the current brokerage community.

While economic theory provides good reason to believe that the rise of e-commerce might influence the commercial brokerage business, both at the firm and industry level, a proper analysis of the likely nature of any impact cannot be accomplished before we know just what is at stake. In other words, we need to determine how many resources there are in the commercial brokerage business. This turns out to be a difficult task for two reasons. First, brokers do not perform a single, homogenous task for which they are paid. They perform a variety of tasks, some of which are much less likely to be influenced by e-commerce than others. Second, data on the commercial brokerage industry, in aggregate or for specific property sectors, is very sparse, as most firms still are relatively small and not publicly-traded. There are no precise estimates of industry or sector size and revenue streams on which to base our analysis. Consequently, we focus below on developing such estimates for the industrial and office sectors in particular. They merit much of our attention, not just because the *Society of Office and Industrial REALTORS' Educational Foundation* is our funder, but also because the most reliable

data are available for those property sectors.

II. Estimating the Size of the Commercial Brokerage Industry

A Review of of Some Previous Estimates

Data on the size and revenues of the commercial brokerage industry are very sparse, largely because the industry is very fragmented, being comprised of numerous, relatively small firms. In addition, firms historically have been reluctant to share data for competitive reasons and no industry organization has successfully established industry-wide standard definitions for even the simplest metrics such as usable square footage. The absence of dominating, publicly-traded firms means that publicly-available, audited documents do not exist that would allow a relatively easy accounting of industry size and revenues. Hence, the size of the brokerage industry must be imputed.

A standard imputation method is to determine the scale of the brokerage business based on estimates of the stock or value of real estate. Conceptually, once one knows the stock of buildings, the revenue flow to the brokerage industry can be computed based on assumptions about transaction frequency and knowledge of commissions and other payments to the sector. Unfortunately, everything in the previous paragraph regarding the private, dispersed nature of the brokerage business applies to the real estate industry generally. Hence, we begin with a review of some existing studies that estimate the size of the real estate sector. Table 1 lists estimates from the academic and business research communities over the past decade.

[Insert Table 1 here.]

Mike Miles and various of his colleagues were the first to provide regression-based imputations

of the size of the real estate sector.[3] Their research strategy was to sample property tax records and then to employ a multiple regression analysis to impute national estimates. Very briefly, Miles and his colleagues began with aggregate data on property tax records at the state level. These state-level data were needed to obtain gross estimates of real estate wealth. The authors then performed a multiple regression analysis in which they regressed their real estate wealth measure on various demographic and economic factors including per capita income, the home ownership rate, the unemployment rate, population density, the age distribution of the population and the like. The regression results informed the researchers how correlated the various demographic/economic factors were with respect to real estate wealth in the sampled areas. The researchers then used these correlations to impute real estate wealth in non-sampled areas in the rest of the nation. They also performed the same type of analysis at the county level, using a small subset of counties for which they could obtain property tax records as the base from which to estimate real estate wealth in other non-sampled counties.

Estimation error in these studies is relatively large because the underlying data upon which the regressions are based are limited. For example, the small number of observations led the authors to include variables in their imputations that were not statistically significant at confidence levels normally used by academic researchers. This implies that the resulting size estimates are relatively imprecise. In statistical terms, there is a very wide confidence interval around the estimate. In addition, data from a very small subset of areas is used to impute conditions in the rest of the country. Unless the relationship

[3]The interested reader should especially see Mike Miles, Robert Pittman, Martin Hoesli, Pankaj Bhatnager, and David Guilkey, AA Detailed Look at America=s Real Estate Wealth@, *Journal of Property Management*, July/August 1991: 45-50, and David J. Hartzell, Robert Pittman, and David Downs, AAn Updated Look at the Size of the U.S. Real Estate Market Portfolio@, *The Journal of Real Estate Research*, Vol. 9, no 2 (1994): 197-211.

between (say) income and the size of the real estate industry is the same in the sampled and non-sampled areas, the estimates are biased. Only if one had data from a representative sample of areas that is not subject to systematic measurement error would the resulting national estimate be unbiased. Unfortunately, this clearly is not the case in the studies done to date, as no such data has existed heretofore. And, bias issues aside, much better data are needed to increase the precision of the estimates.

The best possible data source would be a census B of buildings in this case. Accurately counting buildings always is preferable to estimating the number of structures. While academics tend to use more advanced statistical tools, we generally favor the estimates from the business community because they almost always are founded at least in part on some accurately counted base of data. The well-known estimate of industry size from the *Emerging Trends* annual report cited in Table 1 is a leading example. Many assumptions, some implicit and some explicit, regarding key variables such as value per square foot and cap rates, underpin the $4.3 trillion estimate in the latest report. However, there is much good counting of capital flows and the like that helps form the base from which Lend Lease and PriceWaterhouseCoopers impute total industry size.

In conclusion, there are a number of recent studies of the size of the real estate industry upon which we could base an estimate of commercial brokerage commissions and profitability. However, each of the existing studies suffers more or less from a variety of data problems or estimation error. Consequently, we proceed to develop our own estimate of sector size, focusing on the office and industrial sectors for the purposes of this project.

Estimation of Office and Industrial Sector Size Based on an Underlying Census

The twin problems of imprecise and biased estimates of office and industrial sector size can be minimized the more one can rely on a well-designed census or count of properties. A well-designed census is one in which the enumeration of buildings is done on a consistent basis and in which as much of the true population of structures as possible is captured. While there are a number of potential data sources on office and industrial properties, the market information available from the CoStar Group most closely approximates a well-designed census as just defined.[4] Consequently, their data serves as the base from which our estimations are made. From this point forward, we refer to this as the 'base census data' for our study.[5]

For our purposes, the biggest drawback to this base census data is that it does not include all markets in the United States, making the census incomplete from a national perspective. Fortunately, many major markets are covered, as documented by the list reported in Table 2. The base census data include all industrial and office properties containing at least 10,000 square feet. Thus, some small

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4 We did consider various alternative data sources. With most other sources, there was no clear standardization of the process by which data are collected across individual markets. In addition, the CoStar Group data include a broader set of properties in the markets that are tracked, making their samples more representative of the population of buildings. [See footnote #14 for the details on a comparison involving a subset of markets.] This is the case largely because the business strategy of that firm is to provide data on as wide an array of properties and submarkets as feasible. For almost any other firm, corporate strategy would dictate a focus on a smaller, more targeted subset of properties or submarkets.

5 It should be noted that our use of the their data does not constitute an endorsement of the firm or its data for business purposes. As researchers, we find it useful because this source most closely resembles a census of buildings. Industry practitioners typically need other information such as the extent of vacancy or the asking rent in a given submarket of a metropolitan area, and the timeliness of that data often is critical. We have no information on whether the CoStar Group data are superior to other sources in those (and other) respects. And, because the stock of buildings changes so slowly, timeliness beyond annual updates is immaterial to us.

buildings are missed, but this source provides the most comprehensive listing of office and industrial space available in the public domain.[6] In addition, information is provided on leased and vacant space and average quoted rent per square foot by property type and by suburban versus central business district location. Corporately owned and occupied properties are in the sample, but institutional and government properties are not.[7]

[Insert Table 2 here.]

Having begun with as good a census of office and industrial buildings as possible, we still have to make a number of adjustments and imputations in order to produce an estimate of the size of the national office and industrial markets. Most obvious is the need to understand how much of the overall market is reflected in the base census data. Because office and industrial properties are not distributed the same across space, it probably is the case that the base census data include different percentages of the national stock for these two sectors. In a related vein, we need to understand better the extent to which the base census data are appropriate for use in estimating property inventory in non-covered markets. Because the non-covered markets almost certainly are the smaller, less valuable ones, simply assuming rents and values in them are the same as in covered markets would result in an overstatement of the true size of the office and industrial sector. We also need to adjust for the fact that the average quoted lease rates we use (which are for the third quarter of 2000 (2000(3)) do not reflect past rents. Because rental rates have been rising over time, exclusive reliance on these data would result in

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6 We refer the interested reader to the company web site, www.costargroup.com, for details on firm policy regarding data collection procedures and the like.

7 Knowledge of corporately-owned space is important to us because that space will not generate the same commission revenue stream as does non-corporately owned space. We are grateful to the CoStar Group for providing us a breakdown of corporately-owned space in each market.

overstating the true rental flow on the buildings, as many in-place leases reflect rents from previous years.

With respect to the first issue of how much of the nation's overall office and industrial market is covered in the base census data, the only estimate we could find is from a FirstUnion Securities report of April 2000.[8] That report concluded the markets covered account for approximately 65 percent of the total stock of office and industrial properties in the United States. Subsequent conversations with other industry participants, including the FirstUnion Securities report author, led us to the following conclusions. First, the 35 percent non-coverage factor for office space should not be changed. However, the figure for industrial properties is understated and needs to be adjusted upward. This is because industrial properties and office properties are not spatially distributed in the same way across the country. Industrial space tends to be less concentrated, being more dispersed in less dense, non-urban parts of the country. In addition, industrial sites often are not multi-tenanted, do not have as frequent turnover as office, and are generally less lucrative to the brokerage community -- all of which combine to make it easier for these properties to elude brokerage attention and coverage in the data. Consequently, we decided that the extent of industrial property coverage was substantially lower than that for office. Specifically, we presume only 45 percent of the national stock of industrial properties are covered in the base census data and use that figure when imputing national totals for industrial space.[9]

Data from the SIOR/Landauer publication *Comparative Statistics of Industrial and Office*

8 FirstUnion Securities Equity Research Department, "E-Real Estate", April 18, 2000.

9 We very much appreciate the time the First Union Securities report author, Burl East, spent discussing this issue, among others, with us. That said, we emphasize that we alone are responsible for the

Real Estate Markets then are employed to help determine how to adjust the quoted lease rate figures to better reflect the true average lease rate in force in each market.[10] For this task, only office data were used, as our examination showed that the two sets of industrial data were not compiled in a manner that made them readily comparable. First, across all covered markets, we estimate that the mean rental rate increased by about 4.5 percent from the beginning to the end of 1999.[11] For simplicity, we then assumed that this rental rate trend extended forward and back in time from 1999 on a non-compounded basis. A further assumption regarding the average length of lease is necessary before overall rental revenue can be calculated in each market. We presumed that the typical lease has a five-year term. If an equal number of leases were signed in each year, the average remaining term is 2.5 years (i.e., the average lease was put into effect 2.5 years ago). Combining this with the 4.5 percent estimated annual rental increase leads us to adjust the current rent data by 11.25 percent (i.e., 11.25=2.5*4.5). That is, for the purposes of computing rental revenue arising from currently leased space, we presume the average rent is 11.25 percent lower than the rate on the most current lease information available to us.[12]

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decision to use the 45 percent figure for industrial space.

10 See *Comparative Statistics of Industrial and Office Real Estate Markets.* Society of Industrial and Office REALTORS and Landauer Real Estate Counselors. Washington, DC., 2000.

11 We arrived at this figure via the following approximation. The SIOR/Landauer office data reflect various industry reporters' information on rental rates in their local markets over the past year, typically expressed as a range of increase (or decrease) over the previous year. [We use the midpoint of the range reported in our calculations (i.e., the midpoint of a 1-5 percent range is 3 percent).] For each market listed in Table 2, we computed the recent trend in rental rates based on their reports. The 4.5 percent average increase for the nation is then arrived at by weighting the individual market data by total lease revenue arising from leased space based on current rents.

12 Sensitivity analysis showed that relatively minor changes in the underlying assumptions (e.g., assuming a seven year lease term rather than a five year term) do not materially impact the commission revenue estimates reported below.

Further investigation then showed that it would be inappropriate to assume that rents in non-covered markets were equal to the major markets listed in Table 2. A fairly complex chain of reasoning and calculations led us to conclude that the average rent on the 35 percent of office and 55 percent of industrial properties in non-covered markets was about 20 percent lower than the average in the covered markets listed in Table 2. The conclusion is based on an analysis of a sample of ten metropolitan areas covered by both the CoStar Group and SIOR/Landauer.[13] For each market and each data source, we began by multiplying the leased square footage by the appropriate rental rate, then totaled these figures and divided them by the total leased square footage totals to weight appropriately the differences in the markets' rental rates and sizes. The SIOR/Landauer figures were then adjusted up by 4.5 percent pursuant to the discussion in the previous paragraph. On average across the ten sample markets, these computations indicated that SIOR/Landauer rents were about 27 percent higher than reported by the CoStar Group. We believe this reflects the fact that the SIOR report contains data on a smaller, more valuable subset of properties that is more relevant to its audience.[14]

Following the establishment of this relationship, we then sampled a new set of 15 metropolitan areas not listed in Table 2, but reported in the *Comparative Statistics of Industrial and Office Real*

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13 Those markets are Baltimore, MD, Boston, MA, Chicago, IL, Denver, CO, Houston, TX, Indianapolis, IN, Louisville, KY, Orange County, CA, Orlando, FL, and Seattle, WA.

14 That this is the case is strongly suggested by the fact that the CoStar Group data report much higher square footage figures in each market. For the ten markets used in this particular analysis, that source's square footage numbers summed to 1.1573 billion square feet, more than double SIOR/Landauer's 0.5703 billion square feet for the same metro areas. Other differences in reporting and quality control also may help account for the difference. For example, SIOR/Landauer reports its data by different quality categories of office properties. CoStar aggregates across A and B properties. SIOR/Landauer also reports a weighted average across its quality categories which may not reflect the true mean, as we cannot tell what weighting scheme is used.

Estate Markets.[15] A mean square footage lease rate was determined following procedures analogous to those outlined just above. The mean implied rent across all these markets was found to be 19.6 percent less than that in the covered markets from Table 2. Hence, we conclude that rents in non-covered markets are approximately 20 percent lower than those in the covered markets.

After making these adjustments and imputations, we can estimate the total amount of office and industrial space. Table 3 reports figures on total square footage, with column one reporting data on the markets listed in Table 2 and column two reporting our estimates for the nation. Space is broken down by location within the metropolitan area, by vacancy status, and by whether it is owner-occupied. The latter is important for calculations made below, as we presume that owner-occupied space is of much less value to the brokerage industry.[16]

Total office and industrial space in the covered markets is about 15.1 billion square feet.[17] The second column of Table 3 then reports estimates for the nation that reflect our assumptions that the covered markets listed in Table 2 contain 65 percent of all office space in the country and 45 percent of all industrial space. As Table 3 indicates, we estimate there are over 7.3 billion square feet of office

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15 The markets investigated are Albuquerque, NM, Boise, ID, Charleston, SC, Chattanooga, TN, Colorado Springs, CO, Des Moines, IA, El Paso, TX, Hartford, CT, Las Vegas, NV, Minneapolis/St.Paul, MN, Norfolk, VA, Portland, OR, Providence, RI, Richmond, VA, and Rochester, NY.

16 A surprisingly large 17.7 percent of office space in covered markets is corporately owned and occupied. That said, there is a wide range for the fraction of owner-occupied space across markets, with the percentage much lower in the bigger, higher valued markets. Nearly 31 percent of all industrial space is owned by its user. We presume the fraction of corporately-owned and occupied space in non-covered markets equals the average for the markets tracked by the CoStar Group.

17 With respect to the data in the first column, the CoStar Group's web site notes that it contains just over 20 billion square feet of office and industrial properties, but the company confirms that this includes past and current sales including retail space sales. Thus, the 15.1 billion figure is accurate for existing office and industrial space.

space nationwide, and nearly 23 billion square feet of industrial space, for a combined total of just over 30.2 billion square feet.

[Insert Table 3 here.]

While data restrictions lead us to concentrate on the office and industrial sectors, Table 4 reports square footage estimates for multifamily, hotel, and retail property types, along with summaries of our office and industrial estimates. The National Multifamily Housing Council (NHMC) reports that there were 15.854 million multifamily units based on data from the 1999 *American Housing Survey*.[18] Assuming 750 square feet for the average unit, this implies about 11.9 billion square feet of multifamily space in aggregate.

With respect to hotels, Smith Travel Research reports data from the U.S. Lodging Census indicating there are 3.6 million hotel rooms in the United States. The U.S. Lodging Census data base tracks over 34,000 establishments with 20 or more rooms and is estimated to include over 98 percent of all available rooms. This implies 1.1 billion square feet of hotel room space, presuming the average room contains 300 square feet.[19]

Finally, our 5.5 billion square feet of retail space is based on Lend Lease's estimate from its *Emerging Trends 2001* report. More specifically, Lend Lease estimates that there is 20 square feet of

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18 It should be emphasized that this figure is for multifamily units only, with multifamily being defined as part of a property containing five or more units. The total number of rental units, including those in smaller properties with from 1-4 units, is much larger. However, we suspect that commercial brokers collect few, if any, commissions from those smaller properties.

19 See their web site www.str-online.com for the details. Another source for this sector is the American Hotel and Motel Association (AHMA), which also cites Smith Travel Research and U.S. Lodging data. The AHMA estimates there are 3.9 million rooms in 52,000 properties. Using the same square footage assumption, this implies a slightly larger total square footage of 1.2 billion. We suspect the small difference is due to the AHMA's inclusion of more smaller properties in its data base. See their web

retail space per capita in the United States. Given the Bureau of the Census population estimate of 274 million, the implied square footage is 5.48 billion. While there are other commercial property types that one can sell or lease (e.g., farmland, timber land, etc.), Table 4 captures the bulk of commercial space in the United States.

[Insert Table 4 here.]

Table 5 next reports aggregate lease revenue estimates for the office and industrial sectors. The national estimate of these annual revenues is approximately $184 billion on office and industrial properties.[20] These estimates are for the entire nation and thus include imputed rents from properties in non-covered markets (i.e., in areas not listed in Table 2). Moreover, these estimates incorporate all the adjustments and imputations discussed above. Not surprisingly, office space is considerably more valuable per square foot and in aggregate, even though there is substantially more square footage of industrial space.

[Insert Table 5 here.]

Annual brokerage commissions on office and industrial space now can be estimated based on lease revenues. Our first step is to estimate project leasing and tenant rep commissions. As above, we assume that lease terms are for five years on average, implying that 20 percent of the leased space rolls over every year. This rollover space is the foundation from which we calculate the commission pool available in a year. Because this is newly rented space, commissions are based on existing market rents,

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site www.webprod.ahma.com for the details.

20 One can perform various types of sensitivity analysis by changing any of the underlying assumptions. One of the more interesting ones is with respect to corporately-owned and occupied buildings. If no office or industrial buildings were corporately-owned or occupied (equivalently, if these structures were as economically valuable to brokers as other real estate), we estimate that total lease revenues would be

not older, in-place rents. In aggregate, these rents amount to $41.7 billion.[21]

Table 6 shows that we estimate from $8.5-$9.7 billion of commission revenue is generated from space that rolls over, with the number depending upon the fraction of tenants who renew. We experiment with renewal rates of from 50-75 percent, which accounts for our range of commission estimates. Given market brokerage commission conventions, the higher the renewal rates, the lower the ultimate brokerage commission income.

A number of steps were involved in developing the figures reported in Table 6. Briefly, commissions of varying amounts are assumed to be generated on four categories of rollover space: (a) 4 percent commissions for cases in which the tenant renews and has a tenant rep broker; (b) 3 percent commissions for cases in which the tenant renews, but does not use a tenant rep broker; (c) 6 percent commissions for cases in which the old tenant does not renew, and the new tenant usesa tenant rep broker; and (d) 4 percent commissions for cases in which the old tenant does not renew, but the new tenant does not use a tenant rep broker.[22]

The process by which our commission revenue estimates in Table 6 are arrived at can be made more clear by beginning with the case in which only 50 percent of tenants are assumed to renew. With this assumption, tenants renew on space generating $20.8 billion of rent ($41.7*.5). Of those who do

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approximately $227 billion.

21 Note that this is appropriately larger than .2*$184 billion ($36.8 billion), as the aggregate lease revenue number from Table 5 reflects both current and in-place rents, while commissions on rollover space should be based on current rents only.

22 The commission rates used were arrived at following an informal survey of about a dozen brokers and brokerage firm executives from around the country. The figures we use reflect averages as there was significant variance across markets. It also should be noted that the commission rates used take into account payments in a co-broker situation when appropriate. Finally, we also experimented with different rate assumptions and comment below on those results.

renew, half are presumed to use a tenant rep broker who, with the project leasing broker, shares a 4 percent commission. The implied commission revenue is $2.1 billion ($20.8*0.5*.04*5yrs).[23] The distribution of this revenue by property type is listed in the first column of Table 6 for the 50% Renewal assumption under the heading Tenant Renews, Tenant Rep Broker. The other half (of the half who do renew) does not use a tenant rep broker, so the commission is presumed to be lower at 3 percent. The implied commission revenue on this space is $1.6 billion ($20.8*0.5*.03*5yrs), the distribution of which is presented in the 50% Renewal part under the heading Tenant Renews, No Tenant Rep Broker.

Summing the total revenues arising from renewals under the 50 percent assumption yields a project leasing and tenant rep commission stream of approximately $3.64 billion. Under the alternative assumption that 75 percent of tenants renew in space that is rolling over, we obtain a revenue stream to the brokerage industry of nearly $5.5 billion. This represents the sum of the $3.1 and $2.3 billion figures in the 75% Renewal columns for the Tenant Renews, Tenant Rep Broker and Tenant Renews, No Tenant Rep Broker headings in Table 6.

Moving now to the fraction that does not renew, our calculations presume that 90 percent of the relevant space is released to someone who uses a tenant broker. For this space, a total commission of 6 percent is assumed split between the tenant rep and the landlord broker. Note the wide difference in resulting commission revenue depending upon the fraction of tenants renewing. If only 50 percent of tenants renew on space rolling over, the commission stream on the non-renewing space for which there

23 Given the five year lease term assumed here (which we believe better represents most newer leases), we assume the commission is paid in cash up front. We acknowledge that this often is not the case on longer leases.

is a tenant rep broker is $5.6 billion ($20.8*0.9*.06*5yrs), as shown in the first column under the Tenant Does Not Renew, Tenant Rep Broker heading of Table 6. This compares to only $2.8 billion if 75 percent of tenants renew.

The remaining 10 percent of space is presumed leased to tenants who do not use tenant rep brokers (i.e., the tenant simply walks in without having a broker). A commission of 4 percent is assumed on this space. Implied commissions here are $417 million under the 50 percent tenant renewal assumption versus $208 million if 75 percent of tenants are presumed to renew. (see the last two columns of Table 6 under the Tenant Does Not Renew, No Tenant Rep Broker heading).

Depending upon the fraction of tenants who renew, commission revenues from space rolling over ranges from $8.5 billion to $9.7 billion with a midpoint of $9.1 billion. Naturally, the higher figure obtains the lower the fraction of tenants renewing.[24] However, this range still does not capture all possible revenues to the brokerage industry, as commissions are also earned on investment sales and corporate dispositions.

The top panel of Table 7 reports our estimates of commissions from investment sales as ranging from $1.4-$3.0 billion, with a midpoint of $2.2 billion. This range is estimated as follows. First, we begin with square footage by property type at the national level. For this calculation, leased square footage is computed net of corporately-owned and occupied space. [Commission revenues from

24 We experimented with other commission rates, most of them lower than the figures used in the analysis reported in the text. Assuming that rates are systematically lower so that only a 3 percent commission is reaped on a renewal with a tenant rep, only a 2 percent commission is paid on a renewal without a tenant rep, only a 4 percent commission is paid when there is a new tenant with a tenant rep, and a 3 percent commission for a new tenant without a tenant rep, our aggregate revenue estimate falls to $5.9 billion (under the 50 percent renewal assumption). Assuming commissions midway between those listed in this footnote and those used in Table 6 yields an aggregate revenue estimate of $7.8

corporate dispositions are computed below.] We then assume an average value per square foot for each of the four property subtypes analyzed.[25] Asset values are the product of square footage and price, of course. The frequency with which buildings sell is very important, of course, and is presumed to vary by property type. Specifically, central business district offices and standard industrial properties are presumed to sell once every ten years. Suburban office and flex space is presumed to sell once every seven years. Because of the relatively wide variation found in commission rates for investment sales, in all cases except for CBD office, we provide estimates based on a range of commission rates as follows: (a) a 0.75 percent commission is earned on investment sales of CBD office product; this is the only product type for which we do not vary the commission rate; (b) the commission on an investment sale of a suburban office is presumed to vary from a low of 1 percent to a high of 2 percent; (c) the commission on an investment sale of industrial space is allowed to range from a low of 1 percent to a high of 3 percent; and (d) the commission on an investment sale of industrial flex space is as low as 1 percent and as high as 3 percent.

If the lowest possible commission rates are presumed for each product type, simple multiplication yields the nearly $1.4 billion figure in total commissions under the Low Commission Case column. Using the upper end of the commission rate ranges produces the nearly $3.0 billion figure, with a $2.2 figure resulting from using the midpoint of the commission ranges. Hence, commission revenues from investment sales are significant from an economic standpoint even if commission rates are no more than one percent for any property type.

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billion.

25 Office properties in the CBD were assumed to sell for $200 per square foot; suburban office was assumed to go for $135 per square foot; regular industrial sites were presumed to sell for $30 per

The figures in the bottom panel of Table 7 report our estimates of commissions arising from corporate dispositions. These dispositions occur only on corporately owned and occupied buildings, with the space identified by the CoStar Group scaled up to the national level as outlined above in Table 3. We presume valuation per square foot by property type is identical to that reported above in footnote #25 for non-owner-occupied space. Corporate dispositions are presumed to occur with much less frequency than investment sales. Hence, for corporately-owned CBD office and standard industrial product, we assume the typical building sells once every 40 years. The average suburban office or industrial flex building is assumed to sell once every 25 years.

We then compute a range of estimates of commission revenue based on the following assumptions for the upper- and lower-bounds on commission rates: (a) a 1 percent commission is earned on a corporate disposition of a CBD office building; for this product type there is no variance in commission rate; (b) the commission on a corporate sale of a suburban office ranges from a low of 2 percent to a high of 4 percent; (c) the commission earned on a corporate disposition of basic industrial space ranges from a low of 4 percent to a high of 6 percent; and (d) the commission earned from a corporate transaction of industrial flex space ranges from a low of 3 percent to a high of 5 percent.[26]

Not surprisingly, commission revenues from corporate dispositions are much lower than those arising from investment sales. However, our low end estimate still is nearly $400 million per annum, with the upper end estimate almost reaching $650 million. If we presume commission rates in the middle of the ranges noted above, the figure is $525 million.

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square foot, with flex space going for $50 per square foot.

26 These ranges for commission rates capture the bulk of responses we received in our informal survey of brokers across the nation.

Aggregating the commission revenue estimates from Tables 6 and 7 yield a range of from $10.4-$13.3 billion. The $10.4 figure is derived from using the lower bound estimates from both tables, while the $13.3 figure presumes the top end of each range is used in each case. Given that conditions do differ across markets, the midpoint of $11.8 billion may be a reasonable approximation of the average for the nation. Given the complexities of industry practice, the fractured nature of brokerage ownership, and the proprietary nature of many real estate transactions, it is not surprising that estimates of the brokerage commission pie (even for the office and industrial sectors) have not been common. Still, this information is perhaps the most critical to monitoring the industry and understanding the impact of new information technologies and changes in service delivery on the bottom line.

Our estimates for the office and industrial sectors can be put in perspective by comparing them to recent estimates for the entire commercial brokerage industry. Both FirstUnion Securities' and Bank of America Securities' real estate research groups recently developed estimates of total brokerage income by applying various sets of assumptions to aggregate commercial real estate.[27] Bank of America further broke its estimates into lease and sale components. However, neither group breaks down commission by property sector. The FirstUnion report estimates $20 billion in brokerage commissions, while the Bank of America study figure is $18.8 billion.[28]

Thus, our estimates for the office and industrial sectors are just over 50 percent of their estimates for all property types. Given the scale and value of the retail sector in particular, we do not

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27 See FirstUnion Securities, "E-Real Estate", April 18, 2000 and Bank of America Securities Equity Research, "E-Commercial Real Estate Industry Overview", August 2000.

28 The Bank of America Securities study includes $11.7 billion in lease commissions and $7.2 billion in sales commissions. Their study uses a given 1.625 to 1 ratio of lease commission dollars to sale commission dollars. Our implied ratio is significantly lower, but we are unable to determine how they

find it unbelievable that commissions on other property types would be as large as for office and industrial. However, a detailed examination of those other sectors awaits better information on lease rates, lease structures, and commission structures applicable to those property types.[29]

In general, we strongly believe it is useful to construct estimates by sector because of differences in rents, leases, and commissions across sectors. Disaggregate data also will be more relevant to those specializing in a given property types. And, such data may indicate that disintermediation by new information technology developments is more likely in one sector versus another.

III. Implications and Conclusions

We conclude this report with a brief discussion of what our estimates mean for future research. While a complete analysis awaits Phase III of the project, a few conclusions already can be drawn. First, the value of the annual brokerage revenues to the industry is large enough to attract the attention of entrepreneurs in the information technology field. Even restricting one's attention to the industrial and office sectors, and making some reasonable assumptions about firm and industry profitability, leverage, and goodwill amortization, the value of the industry as configured is in excess of $5 billion.[30]

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derived theirs.

29 While our focus is on the office and industrial sectors, we welcome suggestions from readers on data regarding lease rates, lease structures, and brokerage commission rates and structures in those three property sectors.

30 The details behind this $5 million figure are as follows. First, assuming a 12 percent earnings before interest, taxes, and depreciation and amortization (or EBITDA) margin on $11.84 billion in revenues results in a $1.42 billion in EBITDA for the office and industrial component of the brokerage industry. The five large public real estate service companies have an average trailing EBITDA multiple of just under four. Private company valuations for brokerage companies range from 3 to 5 times EBITDA. Recent buyout offers for CB Richard Ellis and Grubb & Ellis would imply a market value in the 5 times EBITDA range. However, the multiple for the entire industry should be higher than the multiple for one or even a group of brokerage companies, given that a brokerage customer cannot easily find a substitute

If the investment banking group estimates for the entire brokerage industry are even roughly accurate, the total value for the industry is over 50 percent more than that what we estimate for the office and industrial sectors. And, there may be more value arising from an improvement in the efficiency of the transactions process that results in lower brokerage costs and fees. Such savings could be quite valuable to landlords who trade at higher multiples. The point is that overall value is a prize worth attacking, or to be more precise, trying to take away or disintermediate. Thus, it is useful to proceed by carefully considering how the industrial organization of the commercial brokerage industry might be impacted by new information technologies.

We already know from the stock brokerage industry that disintermediation of commissions is possible, and not just in theory. Firms such as Charles Schwab have successfully used new information technologies to take away brokerage commissions from more traditional, full service investment banking operations. For stock brokerage firms, the rise of the Internet and on-line trading is in the process of fundamentally changing the business model by which those firms operate. That is, the new information technology is not serving merely as another (possibly important) distribution channel. It is changing the way these firms organize and run their firms. For example, the full service firms now understand that they cannot operate a retail stock brokerage business on the assumption that profits from trading shares will be a huge source of net income. These firms are moving rapidly to become investment and money managers, realizing that the margins from share turnover have shrunk and probably will continue to do so. This not only requires a refocusing of managerial talent, it requires different skills within the stock

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for the entire brokerage industry. [Stated differently, the industry is less risky than any one or even a group of individual brokerage firms.] A multiple of 4 would give the industry a $5.7 billion "value", with a 5 multiple equating to $7.1 billion in value.

broker work force, and a new compensation strategy.

Whether new information technology will change the typical commercial real estate brokerage firm so fundamentally is not yet clear, and in any event, will be a major focus of Phase III research. However, even if the Internet functions as a new distribution channel for commercial real estate brokers and does not cause a fundamental change in the underlying business model, it still could change the way commercial real estate brokerage firms operate, who they hire, and how they compensate employees.

To see this more clearly, it is useful to note that brokers are compensated for a variety of activities, not just one. Among them is the ability to source new business, the ability to actually pitch and win new business, and the ability to execute and efficiently manage whatever plan was successfully 'pitched'. While new technology has and will continue to make more efficient the sourcing and winning of new business, we suspect that technology advances are likely to have their greatest impact on the execution part of the brokerage process. The actual execution of a brokerage transaction at its core is a complex communication and project management function. The intersection of computing, wireless capabilities and the Internet could dramatically simplify the process. Consequently, investigation of this type of potential Milgrom-Roberts process improvement will be a central issue for our work.

It then almost goes without saying that anything leading to reorganization within the firm or industry will have a direct impact on the brokers themselves. After all, they share in the commission revenues flowing to the industry. If their employers come under heightened cost pressure from new competitors employing various information technologies (or if the traditional firms themselves employ the new technologies), the number of brokers employed, the type of skills they will need, and the compensation they receive each are likely to be subject to change.

We will also try to integrate our analysis of potential technology impacts within the framework of other changes occurring within the commercial brokerage industry. The rise of new information technologies may interact in important ways with these changes. The continued growth of corporate outsourcing transactions is one such example. In a typical outsourcing agreement, a major corporation will award all of its brokerage work to one (or maybe two) firms. In return for the contract, the client might receive a commission discount. However, because the corporation will likely demand a very customized brokerage process to deliver its transaction management business, it may pay a retainer fee to the brokerage firm to offset the cost of dedicated staff and management from the brokerage firm.

Information technology developments aside, outsourcing alone is changing the brokerage industry in a couple of ways. First, the historic commission rate declines, although this is offset somewhat by the retainer arrangement. Second, a higher level of administration, coordination, analysis, research, and communication are required. Without prejudging the issue until Phase III research is completed, we do suspect that the growth of outsourcing and information technology are not a coincidence. Paired together, they could have important impacts on how firms organize themselves and whom they decide to hire in order to take advantage of this opportunity.

Independent of outsourcing, the spread of information technology seems likely to increase the transparency, if not the ease, of services actually provided. We know from other industries that greater transparency in a transaction tends to expedite the lowering of fee schedules. In a related vein, information technology may reduce the difference in effort required on large versus small transactions. If so, we would expect further impact on fees.

In conclusion, Phase II of our research will document the nature of e-business activities being

undertaken in the commercial brokerage space. Phase III then will delve deeper into the implications of e-commerce and technology advances for the brokerage business – at the industry level, firm level, and broker level.

Table 1: Select Estimates of U.S. Domestic Commercial Real Estate Industry

Source	Year	Estimate (trillions)
Bank of America Securities	2000	$4.0
FirstUnion Securities	2000	$3.4
Lend Lease	2000	$4.3
Hartzell *et. al.*	1994	$2.4
Miles *et. al.*	1994	$4.0
Miles *et. al.*	1991	$2.7

Notes:
1. All figures in nominal dollars. The Consumer Price Index has increased just over 20 percent since 1994, so the 1994 should be multiplied by 1.2 to convert them to current dollars. The analogous conversion rate for 1991 is 1.3.
2. The interested reader also should see Mike Miles, "What is the Value of All U.S. Real Estate?", *Real Estate Review* (Summer 1990) for a review of various estimates from the 1980s.

Sources:
1. Bank of America Securities, Equity Research, "E-Commercial Real Estate Industry Overview", August 2000.
2. FirstUnion Securities, "E-Real Estate", April 18, 2000.
3. Lend Lease and PriceWaterhouseCoopers, *Emerging Trends Report 2000*.
4. Hartzell, David J., Robert H. Pittman and David H. Downs, "An Updated Look at the Size of the U.S. Real Estate Market Porfolio", *The Journal of Real Estate Research*, Vol. 9, no. 2 (Spring 1994): 197-213.
5. Miles, Mike, John Roberts, Donna Machi, and Robert Hopkins, "Sizing the Investment Markets: A Look at the Major Components of Public and Private Markets", *Real Estate Finance*, Vol. 11, no. 1 (Spring 1994): 39-49.
6. Miles, Mike, Robert Pittman, Martin Hoesli, Pankaj Bhatnager, and David Guilkey, "A Detailed Look at America's Real Estate Wealth", *Journal of Property Management*, (July/August 1991): 45-50.

Table 2 - Metropolitan Markets Covered by the CoStar Group

Region	Market
MidAtlantic	Baltimore
MidAtlantic	D.C.
MidAtlantic	Philadelphia
MidAtlantic	Pittsburgh
Midwest	Chicago
Midwest	Cincinnati
Midwest	Cleveland
Midwest	Columbus
Midwest	Dayton
Midwest	Detroit
Midwest	Indianapolis
Midwest	Kansas City
Midwest	St. Louis
Northeast	Boston
Northeast	Long Island, NY
Northeast	NYC - Downtown
Northeast	NYC - Midtown
Northeast	Northern NJ
Northeast	Westchester/So CT
Southeast	Atlanta
Southeast	Charlotte
Southeast	Jacksonville
Southeast	Louisville
Southeast	Orlando
Southeast	Raleigh/Durham
Southeast	South Florida
Southeast	Tampa/St. Pete
Southwest	Dallas/Ft. Worth
Southwest	Denver
Southwest	Houston
Southwest	Phoenix
West	Inland Empire
West	Los Angeles
West	Orange
West	Sacramento
West	San Diego
West	San Francisco
West	Seattle/Puget Sound

Source: Company documents and web site (www.costargroup.com)

Table 3 - Total Office and Industrial Space Estimate
(millions of square feet)

	Covered Markets Only (see Table 2 for listing)	National Estimates
Office		
Central Business District		
Leased	1,113.2	1,712.7
Owner-Occupied	232.7	358.0
Vacant	121.4	186.8
Total CBD	1,467.3	2,257.4
Suburban		
Leased	2,349.5	3,614.6
Owner-Occupied	617.0	949.3
Vacant	360.8	555.1
Total Suburban	3,327.3	5,119.1
Combined CBD and Suburban		
Leased	3,462.7	5,327.3
Owner-Occupied	849.7	1,307.3
Vacant	482.2	741.9
Total Office	4,794.6	7,376.5
Industrial		
Industrial		
Leased	5,025.1	11,166.8
Owner-Occupied	3,463.1	7,695.7
Vacant	706.1	1,569.1
Total Industrial	9,194.3	20,431.6
Flex		
Leased	621.3	1,380.7
Owner-Occupied	354.7	788.2
Vacant	131.3	291.8
Total Flex	1,107.3	2,460.6
Combined Industrial and Flex		
Leased	5,646.4	12,547.4
Owner-Occupied	3,817.8	8,483.9
Vacant	837.4	1,860.9
Total Industrial Space	10,301.6	22,892.2
Combined Office and Industrial		
Leased	9,109.1	17,874.7
Owner-Occupied	4,667.5	9,791.2
Vacant	1,319.6	2,602.7
Total Office and Industrial	15,096.2	30,268.7

Note: Covered markets include those listed in Table 2. Data were obtained by summing the square footage listed for each property typein all of the markets maintained in the CoStar database at the end of the third quarter 2000. (see their web site, www.costargroup.com) for the details. National figures are scaled up to reflect the fraction of stock outside of the covered markets. See the text for the details.

Table 4

Estimate of Total Commercial Space Square Footage, Gyourko & Nakahara (2001)
Billions of Square Feet

U.S. Commercial Office Space	7.4	
Central Business District		2.3
Suburban		5.1
U.S. Industrial Space		22.9
Industrial		20.4
Flex		2.5
Total U.S. Office & Industrial Space		**30.3 billion SF**

Other Property Types

	# of Building or Units	Square Footage **(billion SF)**
Multifamily	15.854 million	11.9 billion SF
Hotel	3.6 million rooms	1.1 billion SF
Retail	N/A	5.3 billion SF
Total Other Property Types		**18.3 billion SF**

Sources: See text.

Table 5 - Total Office and Industrial Lease Revenue Estimates

	Total Lease Revenue ($millions)
Office	
CBD	52,737.9
Suburban	62,279.4
Total Office	115,017.3
Industrial	
Industrial	52,667.2
Flex	17,186.7
Total Industrial	69,853.9
Total Office and Industrial	184,871.2

Note: See the text for the details on how these numbers were computed.

Commissions from Space Rolling Over ($millions)

	Tenant Renews, Tenant Rep Broker		Tenant Renews, No Tenant Rep Broker		Tenant Does Not Renew, Tenant Rep Broker		Tenant Does Not Renew, No Tenant Rep Broker	
	50% Renewal	75% Renewal	50% Renewal	75% Renewal	50% Renewal	75% Renewal	50% Renewal	75% Renewal
	$594.2	$891.3	$445.7	$668.5	$1,604.4	$802.2	$118.8	$59.4
	$701.7	$1,052.6	$526.3	$789.5	$1,894.7	$947.3	$140.3	$70.2
	$1,296.0	$1,944.0	$972.0	$1,458.0	$3,499.1	$1,749.6	$259.2	$129.6
	$593.4	$890.1	$445.1	$667.6	$1,602.3	$801.1	$118.7	$59.3
	$103.7	$155.5	$77.7	$116.6	$279.9	$139.9	$20.7	$10.4
	$787.1	$1,180.6	$590.3	$885.5	$2,125.1	$1,062.6	$157.4	$78.7
	$2,083.1	$3,124.6	$1,562.3	$2,343.4	$5,624.2	$2,812.1	$416.6	$208.3

	50% Renewal	75% Renewal
strial	$9,686.2	$8,488.4

Table 7:

Estimated Commissions from Investment Sales ($millions)

Sector	Low Commission Case	High Commission Case
CBD Office (0.75%, 0.75%)	$257	$257
Suburban Office (1%, 2%)	$697	$1,395
Industrial (1%, 3%)	$335	$1,005
Flex (1%, 3%)	$99	$296
Total	$1,388	$2,952

Estimated Commissions from Corporate Dispositions ($millions)

Sector	Low Commission Case	High Commission Case
CBD Office (1%, 1%)	$18	$18
Suburban Office (2%, 4%)	$103	$205
Industrial (4%, 6%)	$231	$346
Flex (3%, 5%)	$47	$79
Total	$399	$648