Information Asymmetry, Lease Incentives, and the Role of Advisors in the Market for Commercial Real Estate

Dröes, M.; Biermans, B.O.; Koppels, Philip

Publication date
2016

Document Version
Final published version

Published in
American Real Estate and Urban Association International Conference

Information Asymmetry, Lease Incentives, and the Role of Advisors in the Market for Commercial Real Estate

By MARTIJN I. DRÖES* [a,b,c], BORIS O. ZIERMANS[d], PHILIP W. KOPPELS[e]

This version: 06 June 2016

SUMMARY — Using a unique transactions dataset, this paper examines the determinants of lease incentives in the Amsterdam office market. The study focusses on the type of landlord involved (institutional/privately owned) and whether the tenant or landlord used an advisor to help them with the transaction. The results show that an institutional landlord, ceteris paribus, offers 11 percentage points more incentives than a private owner. In addition, a landlord who uses the services of an advisor pays 11 percentage points less incentives. An advisor at the side of the tenant increases incentives by 13 percentage points. The results in this paper highlight the crucial role of market information, information asymmetry, and bargaining in the market for commercial real estate.

JEL–code — R30; D82; L85
Keywords — commercial real estate; office market; lease incentives; advisor; information asymmetry

I. Introduction

Especially in thinly traded, intransparant markets, bargaining plays a crucial role in the formation of prices (Harding et al, 2003). The market for commercial real estate is a typical example of such a market. If we look at the office market in the US alone, there has been 7.5 million square feet of new-to-market leases signed in 2015 and there is an expected new supply of 48.9 million square feet in 2016 (JLL, 2016). Taking into account that the average rent in 2015 is about 30 dollar per square foot (and in many cities much higher), it is safe to say that we are talking about a multi-billion dollar market. This implies that finding good (non-defaulting, long-term) tenants is an important business.

A typical marketing strategy is that a landlord gives lease incentives to ensure that a tenant signs a long-term rental contract. This can be a rent-free period, cash to buy various

* Corresponding author, e-mail: m.i.droes@uva.nl, tel.: + 31 20 525 5414. We thank Peter van Gool and Marc Francke for useful comments.
[a] Amsterdam Business School, Faculty of Economics and Business, University of Amsterdam, Plantage Muidergracht 12, 1018 TV Amsterdam, The Netherlands.
[b] Amsterdam School of Real Estate, Jollemanhof 5, 1019 GW Amsterdam, The Netherlands.
[c] Tinbergen Institute, Gustav Mahlerplein 117, 1082 MS Amsterdam, The Netherlands.
[d] Cushman & Wakefield, Strawinskylaan 3125, 1077 ZX Amsterdam, The Netherlands.
[e] TU Delft Real Estate & Housing, Julianalaan 134, 2600 GA Delft, The Netherlands.

types of equipment, up to a full renovation of the offered space. There is typically a lot of money involved with lease incentives and, to the extent it affects rental income, it also has a fundamental impact on the asset (investment) value of commercial real estate. Although incentives play a crucial role in the market for commercial real estate, there is typically not much known about the exact amount of incentives that are offered or what are the determinants of lease incentives. This paper aims to fill this gap.

In this paper, a unique dataset on lease incentives (rent-free periods/rent discounts) from the Amsterdam office market over the period 2002-2012 is used. Because office markets are intransparent — transactions data is not publically available — and the data is typically fragmented (there are usually several intermediaries involved, all with their own databases), it is difficult to get any kind of consistent data on commercial property transactions, let alone lease incentives. The data used in this paper was gathered by the Amsterdam taxing authority (DBGA) for taxation purposes. We also added transactions data from Cushman & Wakefield. A unique aspect of the dataset is that it also contains information about building characteristics, location characteristics, transaction-specific characteristics and the subjects involved in the transaction (type of landlord/advisors). In particular, the final dataset includes information about the exact location of the office building, number of tenants, length of the lease agreement, type of landlord, the number of square meters as mentioned in the lease contract, and several other location (e.g. office supply in the surrounding area, travel time to nearest highway ramp/station, google walk score) and building (i.e. construction year, whether the building is a high-rise building) characteristics. We use data from Strabo (research company specialized in real estate market information) on whether the landlord or tenant used the services of an advisor to help negotiate a transaction. Because there are some transactions without any lease incentives, we estimate several Tobit regression models to examine the determinants of lease incentives. We focus the discussion on the effect of the type of landlord (institutional/private) and whether there was an advisor on the side of the landlord/tenant involved in the transaction.

The results in this paper show that, ceteris paribus, an institutional landlord offers 10 percentage points more incentives than a private owner. This is sizeable effect relative to the average incentive of about 16 percent. A potential reason for this effect is that a private owner is more performance oriented and as such is less likely to give high incentives. An institutional landlord provides higher lease incentives as the incentives are typically given by an (external or internal) asset manager who is not financially dependent on the actual rent that is given, but just whether the office space is rented out or not. Furthermore, we find that a tenant who uses an advisor to help 'seal the deal' gets 13 percentage points more incentives. Information on market rents and incentives are typically not publically available, which creates an information asymmetry between buyers and sellers, in favor of the sellers. An advisor can provide help in getting the appropriate market information and can give advice

when negotiating a lease contract. Apparently, this alleviates the information asymmetry. From this perspective, hiring an advisor seems to make sense. Interestingly, a landlord using the services of an advisor offers, on average, 11 percentage points less incentives. This is in the same order of magnitude (not statistically significantly different) as the effect of an advisor on the side of the tenant. Apparently, if both the tenant and landlord hire an advisor there is, at least from the perspective of incentives, not much to gain.[1] This seems to be in line with a prisoners dilemma story in which both parties cannot afford *not* to hire an advisor and end up with incurring the cost of hiring an advisor.[2] Interestingly, the data shows that in about 70 percent of the transactions both parties use the services of an advisor.

The results in this paper highlight the crucial role of market information, information asymmetry, and bargaining in the market for commercial real estate. Market information, in a market where information is scarce and goods are heterogeneous, is very valuable to get a good deal. An advisor can provide relevant market information, which is a valuable resource as long as it leads to an informational advantage for the tenant or landlord. Moreover, the underlying financial incentives (type of landlord) determine the bargaining leeway of tenants. The findings in this paper increases our understanding about the functioning of a market that is typically deemed to be highly intransparent.

This paper relates to several strands of literature.

- The value of information in real estate transactions. Levitt and Syverson (2008) find that real estate agents sell their own homes for more than comparable houses of their clients. Greater information asymmetry leads to larger distortions. Similarly, see Rutherford et al. (2005).
- Bargaining with private information. Kennan and Wilson (1993) argue that bargaining, costly delays, and failure to agree can be valuable to convey private information (signaling).
- Bargaining in real estate. Merlo and Ortalo-Magné (2004) provide more insight in the strategic interaction between buyers and sellers by examining a rich source of data on list price revisions and actual offers made by buyers in England. Harding et al. (1993) extend the standard hedonic framework to include bargaining power. Colwell and Munneke (2006) examine bargaining in *commercial real estate markets*, but only focusing on sold properties (not on lease agreements).

[1] Of course, an advisor may provide other valuable services (search for tenants, arranging contracts) decreasing search and transaction costs.

[2] The actual cost of hiring an advisor differs by transaction. It can easily be 10 percent of the yearly rent or a percentage of the negotiated lease incentive. It at least suggests that hiring an advisor is not a trivial decision.

- Marketing. Hendel et al. (2009) show that different real estate marketing platforms can lead to differences in time to sell. Multiple listing service sales sell faster in comparison with a no-service, For-Sale-By-Homeowner platform.
- (Financial) advisors. Howe and Shilling (1990) find that REIT performance is determined by the type of advisor that is used by the REIT. More general: top-tier advisors are more likely to complete mergers and acquisitions deals (Hunter and Jagtiani, 2003).
- Differences in commission structures affect the performance of real estate agents. Munneke and Yavas (2001) show that full-commission agents spend more effort and hence have better results when selling a house, but they also get more listings which crowds out this effect.
- Asymmetric information in commercial real estate. Garmaise and Moskowitz (2004) use the difference in property tax assessments of and market value of commercial real estate to create a measure of (asymmetric) information. Buyers reduce the asymmetric information by a variety of strategies including only buying properties that are nearby. Our paper looks at hiring advisors as strategy.
- Lease incentives. Bond (1994) discusses (theory) the variation (cycle) of lease incentives over time. After vacancy levels peak, incentive levels peak, and this eventually affects rental rates and vacancy rates.

Conclusion: Bargaining, information asymmetry, is a well-established fact in residential markets, but there is much less known about this issue in commercial real estate markets. As such, our paper contributes by providing more insight regarding this topic.

The remainder of this paper is organized as follows. Section II discusses the determinants of rents and lease incentives. Section III presents the data used in this study. Section IV covers the empirical methodology. In Section V, we present the results. Section VI concludes.

II. Determinants of office rents and lease incentives

There is quite some literature available about the determinants of rental prices of office space. A good overview is given by Slade (2000). This literature mainly focusses on contract rents. The research of Moll (2012) and Boots (2014) show that contract rents are not a good reflection of the market situation because the actual (effective) rents are also determined by incentives. The determinants of the effective rental prices are related to the determinants of incentives because the effective rent is adjusted for incentives. To identify potential determinants of incentives, we look more closely at the determinants of the (effective) rental prices.

TABLE 1 — DETERMINANTS OF OFFICE RENTS

Variable	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	XXI	XXII	XXIII	XXIV
Vacancy/supply		✓	✓	✓	✓	✓																		
Density							✓	✓																
Distance to center of city								✓	✓	✓	✓	✓	✓											
Accessibility										✓				✓										
Location															✓	✓	✓							
Floor space								✓		✓								✓	✓	✓				
Number of floors										✓								✓						
Building year								✓	✓			✓						✓	✓		✓			
Functional meters								✓												✓				
Amenities in building																						✓		
Parking norm																							✓	✓
Appearance					✓	✓																		
Lease term				✓		✓																		
Size Transaction				✓		✓																		
Multi tenant							✓																	
GDP						✓																		

I Mills (1992)	**VI Moll (2012)**	**XI Dunse en Jones (1988)**	**XVI Casetti (1997)**	**XXI Frew & Judd (1988)**
II Clapp (1993)	**VII Wheaton (1984)**	**XII Hough & Kratz (1983)**	**XVII Clapp (2003 & 2004)**	**XXII Ho et al. (2005)**
III Wheaton & Torto (1988)	**VIII Bollinger et al. (1998)**	**XIII Brennan ea, (1984)**	**XVIII Shilton & Zaccaria (1994)**	**XXIII Nitsch (2006)**
IV Koppel & Keeris (2006)	**IX Sivitanidou (1995)**	**XIV Cervero & Duncan (2002)**	**XIX Colwell et al. (1998)**	**XXIV Bentvelzen (2012)**
V Boots (2014)	**X Fuerst (2007)**	**XV Can & Megbolugbe (1997)**	**XX Slade (2000)**	

Table 1 shows an overview of several studies and the determinants that were included in those studies. It is evident that many studies include a combination of building, location, and transaction characteristics. Our study will also include a combination of such variables (for a detailed discussion, see Section III), but we will also include some subject-specific variables. It is evident that subject-specific variables, like the type of landlord and whether there are advisors involved, are typically not taken into consideration, let alone in relation to lease incentives. Notable exceptions, but only focusing on the residential market, are Gu & Colwell (1997) and Harding et al. (1993). Harding et al. (1993) use a hedonic framework including the differences and sums of buyer/seller characteristics. They show that factors such as the wealth of households, gender, and other demographic factors, determine bargaining power. Colwell and Munneke (2006) have also applied this approach to the commercial real estate market. Buyers and sellers are divided into five categories: individual, individual in cooperation with bank, corporate, corporate in cooperation with bank, and individual banks. They show that sellers who work together with a bank sell offices for a lower price and buyers buy for a higher price (symmetric bargaining) in comparison to corporate buyers and sellers. Moreover, the involvement of a trust increases bargaining power and decreases the price by 17 percent for buyers and increases the price by 20 percent for sellers. A crucial difference with regard to our study is that we do not focus on transaction prices (investors), but the behavior of the landlord and tenant (rental lease agreements). We use an approach which is much more in line with the 'markup' approach that Genesove and Mayer (1997) used for residential markets.

III. Lease incentives and the Amsterdam office market

A. The Amsterdam office market

Figure 1 shows the main office areas in Amsterdam:

1. Centrum
2. (Oud) Zuid (incl.Zuidas)
3. Zuidoost
4. Teleport-Sloterdijk
5. Westelijke tuinsteden (incl. Riekerpolder)
6. Overige gebieden

The first five areas capture more than 85% of the total stock of office space. The last category includes less important offices areas like Amstel Business Park, de Omval, and de Schinkel.

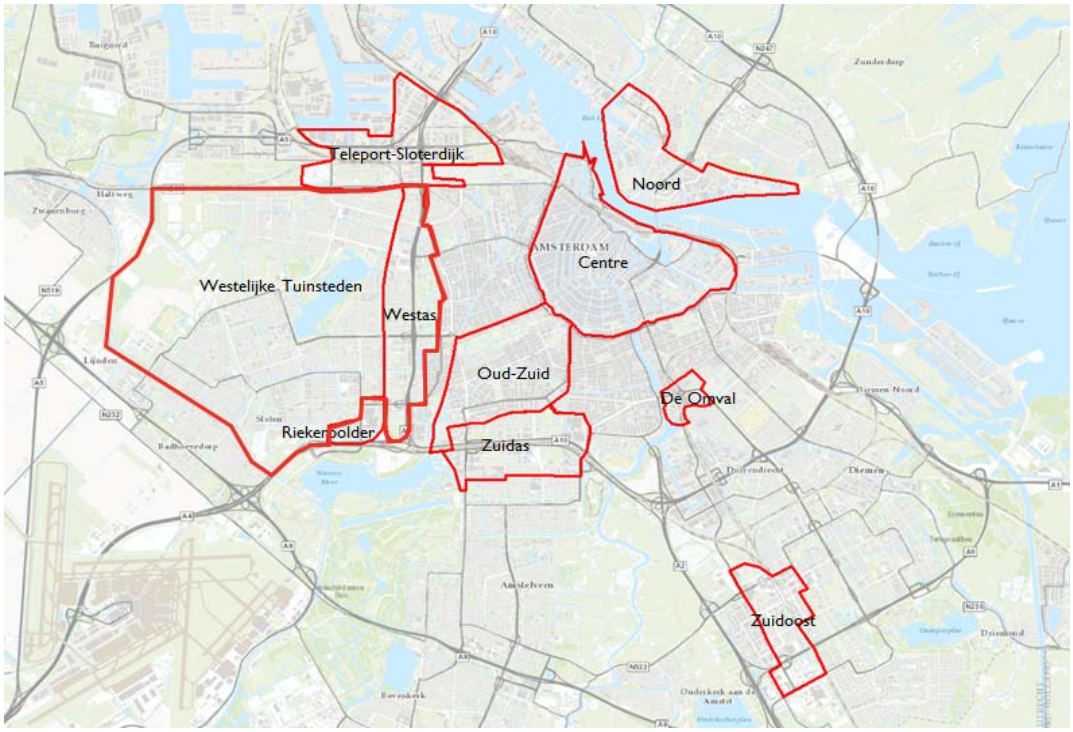
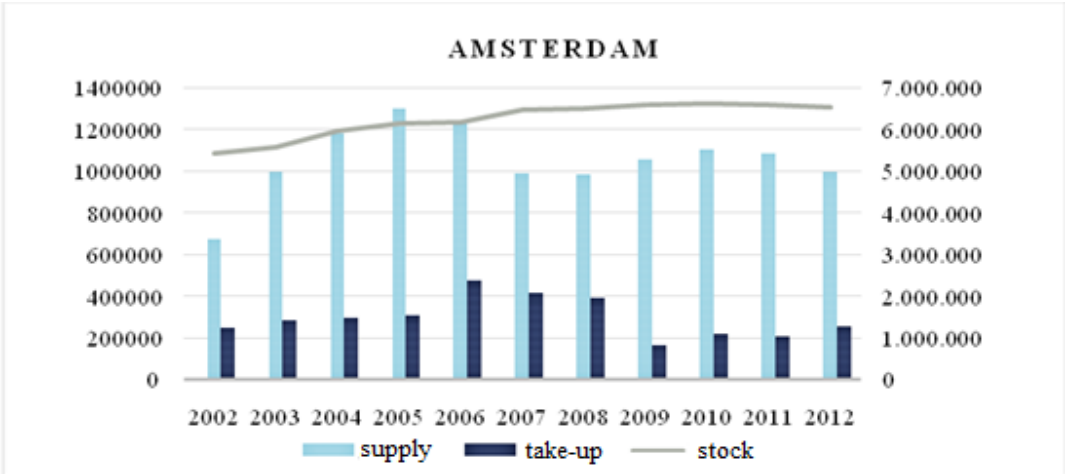


FIGURE 1 — MAIN OFFICE LOCATIONS IN AMSTERDAM



SOURCE: CUSHMAN & WAKEFIELD, OWN CALCULATIONS

FIGURE 2 — SUPPLY AND DEVELOPMENT OF OFFICE SPACE IN AMSTERDAM (SQUARE METERS)

Figure 2 shows the supply and development of office space in Amsterdam. Amsterdam is the largest office market in the Netherlands and provides office space to a variety of large national and international companies. The city has a strong concentration of companies from the ICT sector and financial sector. The European Cities Monitor[3] shows that Amsterdam, from a European perspective, is already for many years a prominent place for businesses to locate. Between 2002-2012 Amsterdam has always had a position in the top ten of most attractive cities to locate as a business. Cities such as London, Paris, Frankfurt, and Brussels are typically more highly ranked than Amsterdam. Amsterdam has a good location in Europe (a major airport and harbor are nearby), the is a stable political climate, and it has an attractive fiscal policy.

Although Amsterdam is an attractive city for businesses to locate, there is a structural oversupply of offices (as of the year 2000). In part, this is the results of excessive construction of new offices, and more recently, due to the financial crisis. Flexible working (working remotely) and ageing of the population has also resulted in a decrease in the number of persons employed. Between 2002 and 2006 office space take-up increased from 250000 m^2 to 478000 m^2 . The increase came after the recession due to the dot-com crisis and the attack on the world trade center in New York in 2001. The inelasticity of supply (pork cycle) is clearly visible in Figure 2 when comparing the take-up in 2006/2007 and the growth in office supply. In 2006, supply barely increased while take-up increased substantially. In 2007, take-up was less but the supply of office space increased a lot. Typically, supply increases with a delay because of the long production time to create new office space. The vacancy rates between 2002 and 2012 varied between 15.2% (2012) and 21.3% (2005). Given a necessary friction level of 5 to 8 percent (OGA, 2006), it is safe to say that the vacancy in the Amsterdam office market is well above the vacancy necessary to ensure a healthy functioning of the market.

B. Lease incentives

Table 2 contains the variables (and sources) used in this study (see the appendix for a detailed description of the sources). The main independent variable is the percentage incentives that is given to a tenant. Although there are many sources of incentives (see Table 3), we only have information on the rent-free period and rent discounts. This implies that the results in this paper only apply to those two types of incentives. Since we underestimate the total amount of incentives, the effects we estimate are most likely an underestimate of the effects we would find if we had a measure of total incentives.

[3] http://www.europeancitiesmonitor.eu/

TABLE 2 — VARIABLES, SOURCES, AND EXPECTED SIGN

Variable	Description	Source	Expected sign
Incentives	Percentage incentives	DBGA*	
Landlord	Private = 0, Institutional = 1.	DBGA*	+
Advisor landlord	no=0, yes=1.	Strabo	-
Advisor tenant	no=0, yes=1.	Strabo	+
Lomvtra	Logaritm of contracted meters of office space.	DBGA*	+
Transaction year	Year of Transaction	DBGA*	+/-
Lease term	Lease term in months	DBGA*	+
Single tenant	0= multitenant if < 90% space, 1= single tenant if ≥ 90% space	DBGA*	+
High building	< 6 floors =0, 6 or more =1	TU Delft	-
Near public transport	Walk distance to nearest station	Arcgis	-
Near highway	Travel time to nearest highway ramp	Arcgis	-
Amenities	Google walkscore	TU Delft/eigen onderzoek	-
Aanbod	Percentage office supply in area.	C&W	+
Centrum	I = specific locate, otherwise = 0	C&W	-
Zuidoost	I = specific locate, otherwise = 0	C&W	+
Zuid & Zuidas	I = specific locate, otherwise = 0	C&W	+
Teleport-Sloterdijk	I = specific locate, otherwise = 0	C&W	+
Westelijke tuinsteden	I = specific locate, otherwise = 0	C&W	+
Overige gebieden	I = specific locate, otherwise = 0	C&W	+/-

*Cushman & Wakefield data used to supplement the data.

The methodology section goes into more detail how incentives are exactly calculated, but basically a discounted cash flow method is used. The incentives are based on a survey done by the Amsterdam taxing authorities, DGBA (in the Netherlands owners need to pay property taxes, which is based on the assessed value of the properties), and covers transactions between 2002 and 2012. We only used transactions with a lettable floor area of 500 m2 or more that were extensively checked for correctness (and approved) by the Amsterdam taxing authorities and subsequently checked by the Technical University, Delft (TU Delft). In total there are 415 transactions available (including 29 transaction taken from Cushman and Wakefield), this is roughly 15 percent of the total number of accepted transactions, 33% were not accepted (for a discussion, see Boots, 2014). We excluded six observations as outliers, leaving a total of 409 observations available for the empirical

analysis. The spatial distribution of the transactions are shown in Figure 3 and Table 4. There are transaction available from all major office locations in Amsterdam.

The data also contains information on the type of landlord, square meters in the contract, the year of transaction, lease term in months, and whether there are one or more tenants. The location is also known, but (also given the number of observations per area) we decided to use the more aggregated definition of office areas as used by Cushman & Wakefield. Whether an advisor was involved in the transaction was take from the research company Strabo. The google walkingscore (measure of amenities nearby) and whether the building is a high-rise building are from the database of TU Delft. Finally, the percentage office supply in a particular area was made available by Cushman & Wakefield. In sum, we include building-specific, location-specific, transaction-specific, but also subject-specific variables in the empirical analysis.

Table 3 — Types of incentives

• One or more rent free periods	(This study)
• Rent discount (typically the first few years)	(This study)
• Fit out contribution and/or 'turn key' completion [a]	
• No re-delivery obligation [b]	
• Relocation allowance	
• Physical adjustment of the property on request of the tenant	
• Signing bonus and/or other payments (money at free disposal)	
• Option on released vacant office space	
• Escape clauses	
• Limit/cap on service costs and/or rent indexation	
• Share in the development profits after sale by the developer to an investor	
• Pay for less square meters than the actual rented square meters	
• Other incentives [c]	

Source: Van Gool (2011). a) Completion including installation package (partitions, carpeting, etc.). b) The tenant does not have to remove the installed amenities and/or does not have to deliver the office space in shell condition. c) The landlord takes over a previous rental contract, extra flexibility in rental contracts, the provision of additional services (shuttle bus service, exclusive advertisement rights).

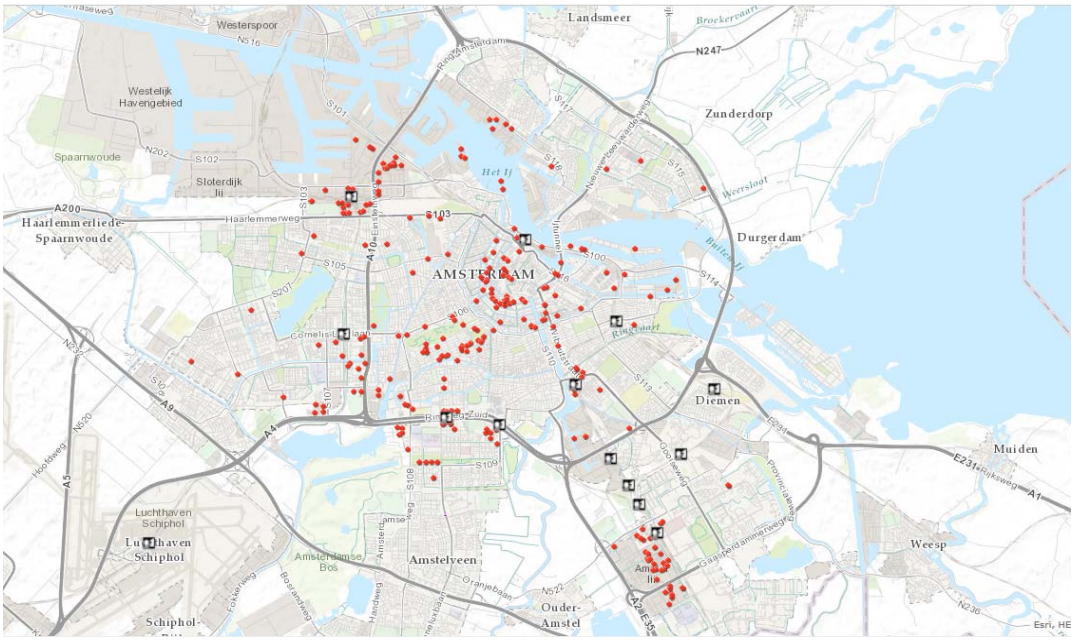


FIGURE 3 — OFFICE MARKET TRANSACTIONS IN AMSTERDAM

TABLE 4 — NUMBER OF TRANSACTIONS PER AREA

Contractjaar	Centrum	Zuid	Teleport-Sloterdijk	Westelijke tuinsteden	Overige gebieden	Totaal
2002	12	3	5	4	14	**46**
2003	12	9	3	3	6	**39**
2004	11	11	4	3	5	**39**
2005	10	4	4	7	5	**35**
2006	12	15	8	2	9	**50**
2007	8	19	3	4	15	**56**
2008	8	11	4	3	12	**43**
2009	8	5	4	2	4	**29**
2010	6	9	2	4	7	**33**
2011	3	15	2	4	8	**37**
2012	4	2	0	0	1	**8**
Totaal	**94**	**103**	**39**	**36**	**86**	**415**

Table 5 contains the descriptive statistics of the incentives dataset. The average incentives are about 8 percent. However, there are relatively a lot of transactions without any incentives (also see Figure 4), something we specifically need to take into account in the empirical methodology. Interestingly, the number of transaction without incentives has decreases over time, especially after the crisis. This seems to suggest that landlords might have adjusted for the economic cycle not by reducing contract rents, but by providing more incentives. Table 6 shows that also the amount of incentives has increased substantially after the crisis. The average incentives, excluding no incentives, is 15.6 percent.

TABLE 5 — DESCRIPTIVE STATISTICS

	Mean	Std. Dev.	Minimum	Maximum
Percentage incentives	0.08191	0.106848	0.000	0.414
Effective initial rent per m^2	169.8135	82.88135	30.32	519.79
Log size transaction (m^2)	7.0494	0.75667	6.21	10.00
Supply	0.16402	0.044619	.074	0.259
Log travel time	1.2023	0.72590	-1.33	2.51
Log distance station	7.1264	0.86827	1.42	8.70
Walkscores	75.67	16.300	27	100
Landlord (institutional/private)	0.60			
Advisor tenant	0.64			
Advisor landlord	0.86			
D2002	0.11			
D2003	0.09			
D2004	0.10			
D2005	0.08			
D2006	0.12			
D2007	0.14			
D2008	0.10			
D2009	0.07			
D2010	0.08			
D2011	0.09			
D2012	0.02			
Contract < 37 months	0.14			
Contract 37 to 84 months	0.68			
Contract >84 months	0.17			
Dummy Single tenant	0.28			
Dum. high building (>5 stories)	0.44			
Construction year until 1900	0.11			
Construction year 1900-1949	0.15			
Construction year 1950-1969	0.16			
Construction year 1970-1989	0.17			
Construction year 1990-1999	0.20			
Construction year 2000 or more	0.21			
Dummy Centrum	0.22			
Dummy zuidoost	0.14			
Dummy Westelijke Tuinsteden	0.09			
Dummy Teleport Sloterdijk	0.09			
Dummy Zuid	0.25			
Dummy Other areas	0.21			
Period		2002-2012		
Number of transactions		409		

TABLE 6 — INCENTIVES OVER TIME

Year	N	Mean	Median	Std. Deviation	Minimum	Maximum
2002	45	0.01799	0.00000	0.038576	0.000	0.209
2003	38	0.03562	0.00000	0.065271	0.000	0.230
2004	39	0.02099	0.00000	0.046028	0.000	0.207
2005	34	0.06721	0.02615	0.082550	0.000	0.233
2006	48	0.06632	0.00000	0.098900	0.000	0.410
2007	56	0.07883	0.01516	0.103562	0.000	0.342
2008	42	0.09551	0.08468	0.094836	0.000	0.352
2009	29	0.15753	0.12260	0.138697	0.000	0.414
2010	33	0.11982	0.06093	0.127426	0.000	0.379
2011	37	0.18798	0.19166	0.116065	0.000	0.362
2012	8	0.14359	0.19565	0.100406	0.000	0.241
Total	409	0.08191	0.01761	0.106848	0.000	0.414

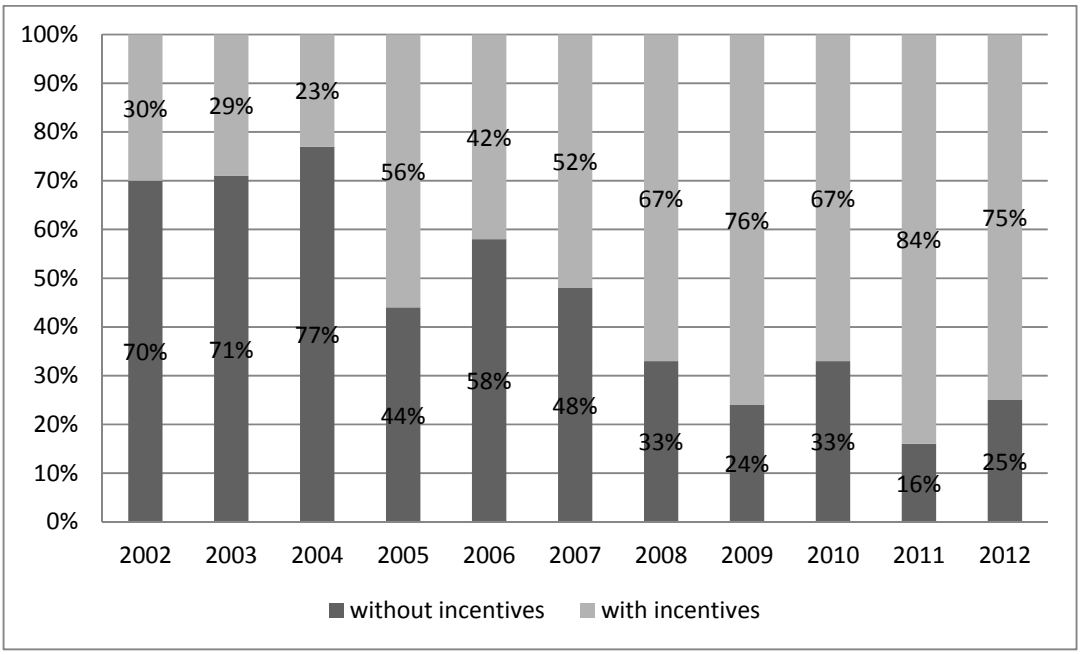


FIGURE 4 — TRANSACTIONS WITH AND WITHOUT INCENTIVES

C. Sample selection, the type of landlord, and the role of advisors

Although there are 409 observations about lease incentives, the type of landlord and the advisor indicators are, unfortunately, only available for a subsample of the data. As long as the sample selection is based on the independent variables (i.e. construction year, location) we would not expect our results to be biased as we will control for those variables. However, if high lease incentives are underreported (see Figure 5 for the distribution of observed lease incentives) it might lead to sample selection bias. For example, the

institutional landlord/private landlord variable is only available for 318 observations. If higher lease incentives are given by institutional landlords (in comparison to private landlords) and these lease incentives are underreported the effect of institutional landlords on lease incentives is underestimated. The descriptive statistics in Table 5 shows that, for those cases were the type of landlord is not missing, about 60 percent of the rental agreements are by an institutional landlord.

Similarly, 64 percent of the tenants (203) used an advisor when negotiating a contract, and this percentage is 86 percent for the landlord (209 observations). It is not strange that a lot of landlords use an advisor as we only have information about new tenants (not contract extension). In case of the 'tenant advisor' indicator we would again expect an underestimation. As an advisor for the landlord is expected to lead to lower incentives the effect of an advisor on lease incentives might be overestimated. Finally, in 72 percent of the transactions both landlord and tenant used an advisor. Even though the dataset has it limitations - it might be difficult to accurately and correctly estimate the effect of the type of landlord and the use of an advisor on lease incentives – it still provides us with an important perspective on a market that is highly intransparant.

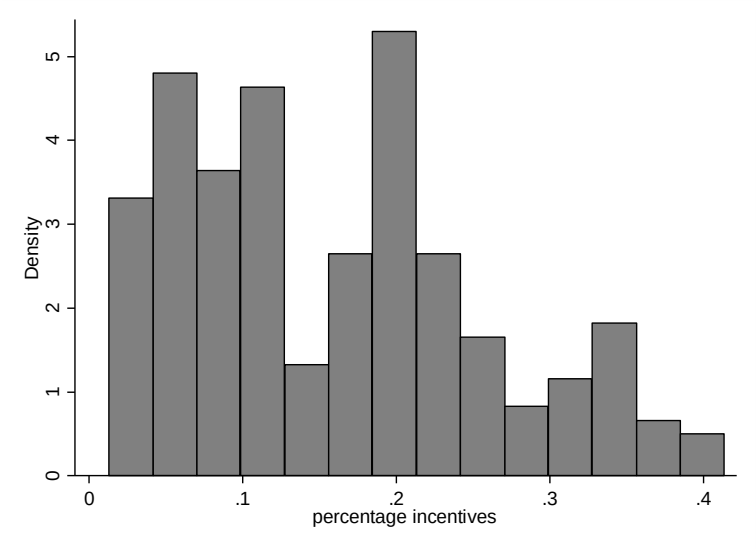


FIGURE 5 —DISTRIBUTION OF LEASE INCENTIVES

D. Other determinants of lease incentives

We also include a variety of other control variables. In particular, the size of the transaction is on average 1,000 m2. The average yearly supply of office space in Amsterdam is 16,4 percent of the total stock of office space in Amsterdam. The Google Walk score is on average 75 and is a measure of accessibility. Not surprisingly, in some transactions in the center of Amsterdam the Google Walk score is a perfect 100. The majority of office market

transactions were done in 2007, the year before the crisis. The majority of rental contracts are between 37 months and 84 months. This is not surprising as it is common practice to have a 5 year rental agreement. We would expect that for a longer rental agreement more incentives are given. In 28 percent of the transactions a single tenant (more than 90 percent of the space rented by a single tenant) rented the office space. This seems like a lot, but in the center of Amsterdam there are relatively small office spaces which is relatively easily rented by a single tenant. About 44 percent of the transactions are done in a high rise building (a building more than 5 stories high) and 41 percent of the registered transactions were based on a building with construction year 1990 or later. The highest number of transactions was in Amsterdam Zuid and Amsterdam Center.

IV. Methodology

An incentive is a factor (financially or non-financially) that facilitates the location choice of companies. As mentioned, in this paper only the rent-free period or rent discount are measured. To calculate the relative incentive, the present value (discounted cash flow method) of the annual rent during (full contract duration) is calculated. Subsequently, the present value is calculated without incentives. The rents are indexed by inflation (i), in the rental agreement this is typically the consumer price index all households, and discounted using the discount rate (r):

$$CW = \sum_{t=1}^{T} * (HI_t (1+i)^t) / (1+r)^t \quad (1)$$

Subsequently, the percentage incentives are calculated as :

$$(\Sigma \text{ CW HI total} - \Sigma \text{ CW HI corrected for incentives}) / \Sigma \text{ CW HI total} \quad (2)$$

Consequently, the percentage incentives is a positive number. The discount rate is assumed to be equal to the risk free rate (rent on 10 year bonds) corrected for the average inflation in the preceding 5 years (CPI with basis year 2006). The average discount rate we used was 2.1 percent, with the highest discount rate in 2008 (2.4 percent) and lowest in 2006 (1.7 percent). A solvable landlord like the government or a stock market listed company might be more prepared to give higher incentives. The risk of a future cash flow for the landlord is incorporated in the discount rate. For a less solvable tenant the incentives may be spread over the rental term to reduce the risk. So, the incentives measure we use is basically a summary measure that already incorporates the potential differences in risk associated with the rental cash flows.

Based on our measure of lease incentives, the following (Tobit) regression model is estimated:

$$I_{i,t} = \alpha + \sum_{k=1}^{K} b_k X_{k,i,t} + \tau_t + \varepsilon_{i,t} \qquad (3)$$

where $I_{i,t}$ is the percentage incentive of transaction i in year t, Xk,i,t are all of the independent variables (again see Table 4). The τt are time fixed effects and εi,t is the error term. We are mainly interested in the parameter estimates of bk for the dummy variable landlord (institutional/private) and the dummy variables advisor tenant/landlord. Because we use the percentage incentives, the interpretation of the coefficients is in percentage points. Note that by using incentives, we use a direct measure of bargaining outcomes. This is a clear benefit in comparison to a hedonic type method where we would adjust for buyer and seller characteristics and would need to assume symmetric bargaining (see Harding et al., 2003). Bargaining, in part, is based on the availability of relevant market information. This is what we try to measure with the advisor tenant/landlord indicators. In terms of empirical strategy, we built up the regression model one variable at a time starting with a base model that includes all of the standard hedonic variables (but without the main variables of interest).

V. Results

Table 7 reports the regression results.[4] In column 1, a hedonic type of regression is reported. In the subsequent columns we add the type of landlord, and whether the tenant and landlord have used the services of an advisor in the transaction. As is customary with this type of Tobit analysis, column 6 contains a recalculation of the results (marginal effects) based on the full model, conditional on positive incentives, and evaluated at the mean of the independent variables. The discussion is categorized by the different variable types: the subjects involved in the transaction, location characteristics, building characteristics, and transaction-specific characteristics.

A. The type of landlord and the effect of advisors on lease incentives

The effect of the type of landlord on lease incentives is reported in columns 2 to 5. An institutional investor provides about 6.2 to 14.8 percentage points more (latent) incentives. This is basically the effect for the whole population of transactions and is typically interpreted as an increase in the incentive to provide lease incentives. In case the latent variable is positive it equals the amount of incentives. Conditional on providing positive

[4] Note that the OLS results are very similar to the Tobit estimates and leads to the same conclusions. Only the Tobit results are reported.

incentives, this effect is 14.8 percent. This is the increase in the conditional expectation of the actual lease incentives in case those incentives are positive, which is commonly regarded as a more useful interpretation of the marginal effects. The effect is statistically significant at the one percent significance level. As mentioned, an institutional landlord (like the government) might care less about lease incentives as those incentives are typically given by asset managers who are not directly financially dependent on the amount of incentives that are given, but are hired to ensure that the building is actually rented out.

An advisor on the side of the tenant has an effect on the latent incentives variable of about 12.3 to 17.5 percentage percentage points. Conditional on positive incentives this effect is 12.7 percent. This effect is sizeable relative to the average incentive of 8.2 percent and average positive incentive of 15.6 percent. The effect is again significant at the one percent significance level and this result is in line with the idea that an advisor is valuable for a tenant from the perspective of increasing lease incentives. The effect of an advisor on the side of the landlord is about the same size, -10.7 percentage points, and again statistically significant at the one percent significance level. The effect, in absolute terms, is however not different from the effect of an advisor at the side of the tenant (F-value=0.64, p-value=0.42). This result at least implies that the competitive forces in the market are such that the information given by advisors are equally valuable (in terms of bargaining power) for both landlords and tenants. We would have expected that tenants are more informationally disadvantaged (information asymmetry in favor of the landlord) and as such would gain the most from having an advisor. With an increased sample size we might have been able to prove such a difference. As it stands now, the difference is small enough (and the accuracy of our estimates, the standard errors, about 2 percent) such that we cannot reject the null hypothesis that there is no difference. It might also be that tenants in the Amsterdam office markets have easy access to the same market information (or are professional enough to acquire such information) as landlords and, as such, are not as informationally disadvantaged as commonly asserted. However it may be, the fact that the difference between both advisor indicators is relatively small (and there are substantial costs of hiring an advisor) suggests that hiring advisor is, although maybe rational, not necessarily the most beneficial outcome. The problem of this prisoners dilemma situation is that both the tenant and landlord cannot credibly promise not to use an advisor. As such, the majority of landlords and tenants end up hiring an advisor just to make sure that they have the relevant market information to close a transaction.

B. The effect of location

Interestingly, we do not find much evidence of differences across office locations in Amsterdam. Apparently, this effect is captured by the other variables like the building characteristics, but also the accessibility measure, and office supply. For instance, we find

that office supply has a positive effect on incentives, even though this effect is only statistically significant at the 10 percent significance level (only in specifications 5 and 6). A potential reason this variables has only a marginal impact on incentives might be due to the fact that supply has a lagged effect on incentives. Another reason may just be that the size of the office locations that are used in this study are just to large (too much heterogeneity in the offered office space).

The effect of the travel time to a highway and walking distance to a train station has an unexpected negative effect on incentives especially in the baseline regression. However, in later specification including the type of landlord and the advisor variables this effect is no longer statistically significantly different from zero. The Google Walkscore, a measure of nearby amenities, has a positive and statistically significant impact only in the final regression model. A standard deviation change in the Google Walkscore (16 out of a potential 100) increase the expected lease incentives, conditional on receiving a positive incentive, by 3.2 percentage points.

C. Building characteristics

A high-rise building has a positive effect on the latent lease incentives variable of 5.9 to 6.9 percentage points. The higher the number of floors the greater to probability of a panoramic view and the more likely the office building is perceived to be a landmark (presige effect). Unfortunately, this effect is only 2.9 percentage points and not statistically significant based on our final estimates reported in column 6. A further building characteristic that we included, the construction year of the building (reference category before 1900), does not seem to have much of an effect on lease incentives. We only find a negative effect in case of some of the later cohorts, but this effect does not seem to hold in our final regression model.

D. Transaction-specific variables

As expected, the results in Table 7 show that the rental term has a positive effect on lease incentives. A landlord is willing to provide more incentives in case the tenant shows a long-term commitment to rent a property. In column 6, a rental agreement of 37 months or more leads to about 7 percentage point more lease incentives. This effect is highly statistically significant.

Further results indicate that the size (in square meters) of the transaction does not have a discernable impact on lease incentives. Typically, we would expect to see more incentives in case of larger transactions. By contrast, if a tenant is willing to hire a majority of the office space within a building, they do get higher incentives. In column 6, this effect is about 4.9 percentage points and it is statistically significantly different from zero at the 5 percent significance level. Apparently, the positive commitment of a tenant to hire such a large part of the office space induces landlord to provide more incentives even though having a single tenant is risky from a cash flow perspective. If this tenant leaves, the majority of the office

space in the building will be vacant. Finally, the results in Table 7 suggest that during the financial crisis (after 2008) higher lease incentives were given to compensate for higher vacancy rates in the office market. Especially in 2009, the lease incentives were 11.7 percentage points higher than in 2002. Relative to 2008, this difference was 6.4 percentage points.

TABLE 7 — REGRESSION RESULTS
(DEPENDENT VARIABLE: PERCENTAGE INCENTIVES)

	(1)	(2)	(3)	(4)	(5)[5]	(6)
	Basis	+Type landlord	+ Advisor tenant	+ Advisor landlord	+ adv. Tenant, adv. landlord	Conditional on pos. incentives
Landlord		0.082***	0.062**	0.073**	0.148***	0.108***
		(0.022)	(0.026)	(0.032)	(0.034)	(0.026)
Advisor tenant			0.123***		0.175***	0.127***
			(0.024)		(0.029)	(0.019)
Advisor landlord				-0.097***	-0.146***	-0.107***
				(0.036)	(0.028)	(0.022)
Log size trans.	-0.005	-0.007	-0.009	0.013	-0.010	-0.007
	(0.011)	(0.013)	(0.016)	(0.018)	(0.016)	(0.012)
Supply	-0.102	0.287	0.178	0.371	0.839*	0.612*
	(0.335)	(0.385)	(0.427)	(0.483)	(0.383)	(0.347)
Log time to highway	-0.035*	-0.020	-0.040	0.003	0.010	0.007
	(0.020)	(0.024)	(0.025)	(0.031)	(0.025)	(0.020)
Log dist. to trainstation	-0.026***	-0.022**	-0.012	-0.012	0.001	0.001
	(0.008)	(0.009)	(0.012)	(0.013)	(0.011)	(0.010)
Walkscore	-0.001	-0.001*	-0.001	0.001	0.003***	0.002***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)
High building	0.069***	0.070***	0.094***	0.059**	0.039	0.029
	(0.019)	(0.022)	(0.025)	(0.029)	(0.028)	(0.018)
Single tenant	-0.026	-0.023	0.036	-0.037	0.067**	0.049**
	(0.021)	(0.026)	(0.027)	(0.033)	(0.031)	(0.022)
Contract 37 to 84	0.073***	0.095***	0.093**	0.118***	0.102**	0.074***
	(0.028)	(0.029)	(0.041)	(0.039)	(0.043)	(0.029)
Contract >84	0.071**	0.094***	0.071	0.106**	0.097**	0.070**
	(0.032)	(0.035)	(0.047)	(0.047)	(0.048)	(0.035)
Centrum	0.032	0.048	0.037	-0.010	-0.015	-0.011
	(0.031)	(0.037)	(0.037)	(0.049)	(0.036)	(0.032)
Zuidoost	0.016	-0.004	0.013	0.001	-0.016	-0.011
	(0.039)	(0.043)	(0.047)	(0.051)	(0.047)	(0.037)
Westelijke Tuinsteden	0.072**	0.102**	0.027	0.047	0.082*	0.060
	(0.036)	(0.040)	(0.043)	(0.054)	(0.046)	(0.039)
Teleport Sloterdijk	-0.002	-0.025	0.013	-0.009	0.033	0.024
	(0.041)	(0.047)	(0.052)	(0.063)	(0.053)	(0.043)
Zuid	0.021	0.025	-0.023	-0.017	-0.021	-0.015
	(0.025)	(0.032)	(0.037)	(0.039)	(0.041)	(0.032)
Const.yr 1900-1949	0.014	0.005	0.053	-0.061	-0.051	-0.037

[5] Especially in this final model the number of observations decreases substantially, while we do estimate a substantial amount of parameters. As a result, we also estimate a regression without year and construction year dummies, but with the variables year, year squared, construction year, construction year squared. The results remain very similar.

	(0.036)	(0.044)	(0.040)	(0.051)	(0.043)	(0.035)
Const.yr 1950-1969	-0.068*	-0.141***	-0.105**	-0.113*	-0.020	-0.015
	(0.040)	(0.051)	(0.050)	(0.068)	(0.046)	(0.038)
Const.yr 1970-1989	-0.045	-0.098*	-0.101**	-0.068	-0.019	-0.014
	(0.039)	(0.050)	(0.047)	(0.069)	(0.046)	(0.040)
Const.yr 1990-1999	-0.044	-0.107**	-0.114**	-0.112	-0.034	-0.025
	(0.039)	(0.051)	(0.049)	(0.069)	(0.045)	(0.042)
Const.yr ≥ 2000	0.011	-0.050	-0.053	-0.040	-0.004	-0.003
	(0.037)	(0.048)	(0.044)	(0.065)	(0.043)	(0.039)
2003	0.012	0.010	-0.001	0.104*	-0.053	-0.039
	(0.040)	(0.047)	(0.047)	(0.061)	(0.054)	(0.045)
2004	-0.022	-0.052	-0.061	-0.015	-0.130**	-0.095*
	(0.037)	(0.043)	(0.051)	(0.060)	(0.060)	(0.049)
2005	0.096***	0.075*	0.040	0.159***	-0.040	-0.029
	(0.036)	(0.041)	(0.051)	(0.049)	(0.060)	(0.047)
2006	0.083**	0.077*	0.075	0.095	-0.004	-0.003
	(0.035)	(0.041)	(0.049)	(0.058)	(0.060)	(0.046)
2007	0.098***	0.072*	0.071	0.091	-0.021	-0.016
	(0.035)	(0.039)	(0.044)	(0.058)	(0.050)	(0.043)
2008	0.133***	0.130***	0.090*	0.130**	0.073	0.053
	(0.034)	(0.039)	(0.053)	(0.054)	(0.053)	(0.042)
2009	0.209***	0.216***	0.172***	0.268***	0.160***	0.117***
	(0.036)	(0.044)	(0.047)	(0.061)	(0.048)	(0.045)
2010	0.145***	0.156***	0.183***	0.210***	0.109**	0.079*
	(0.038)	(0.046)	(0.045)	(0.059)	(0.047)	(0.043)
2011	0.218***	0.246***	0.187***	0.286***	0.079*	0.058
	(0.032)	(0.036)	(0.040)	(0.047)	(0.044)	(0.042)
2012	0.199***	0.190***	0.148***	0.299***	0.121***	0.089*
	(0.052)	(0.056)	(2.38)	(0.054)	(0.040)	(0.050)
Observations	409	318	181	168	112	112
Left-censored	198	159	71	73	35	35
Log Likelihood	9.16	8.87	50.79	25.81	65.58	65.58
Chi kw. Regr.	183.07***	173.79***	155.34***	120.62***	142.34***	142.34***

***,**,*, significance at 1%, 5% en 10%, respectively. Standard errors in parentheses. The coefficients in column 6 are the marginal effects (based on column 5) conditional on positive incentives and evaluated at the mean of the independent variables.

VI. Conclusion and discussion

More insight into the exact functioning of the office market is of fundamental importance for landlords, tenants, and (institutional) investors. This paper has examined the determinants of lease incentives in the Amsterdam office market. A unique dataset from the Amsterdam taxing authority between 2002-2012 has been used. The regression results show that the type of landlord (institutional versus private) has a statistically significant positive effect on the percentage incentives. An institutional landlord, ceteris paribus, offers 10.8 percent higher incentives than a private landlord. This is the effect on the expected percentage incentives conditional on having a positive incentive. A private landlord rents out office space at own account and risk, while an institutionally owned real estate is governed by asset managers who are allowed to rent out office space for the investor. This can be asset managers working for the investor or private asset managers. These managers typically have some leeway to act freely. A private landlord in which each month of free rent is

directly visible in the financial results, might be less inclined to provide incentives. In addition, private landlords are, at least in part, typically financed by debt and may not be able to provide incentives because of bank covenants, but also because there may be substantial monthly costs (rent payments, operational costs). Finally, it may be that a private landlord has a longer investment horizon and, as such, is less affected by lower rents or a private landlord may simply not have enough liquid assets to pay for incentives.

The regression results have also showed that a commercial advisor at the side of the tenant increases incentives substantially. In particular, we find 12.7 percentage points higher incentives. This result seems to be in line with a story in which there is information asymmetry between the landlord and tenant. Negotiating a lease is typically not a core business of a tenant. Moreover, the landlord might be more aware of current market conditions (especially since a landlord typically owns multiple buildings). By contrast, when a landlord uses the services of an advisor it leads to lower incentives. In particular, we find a 10.7 percentage point lower incentive. Apparently, besides finding an appropriate tenant, the advisor might be better aware of the actual market situation than the landlord.

In sum, the results in this paper suggest that better market information results in a better bargaining position for both tenant and landlord. However, our findings also indicate that, even though the coefficient on the indicator 'advisor tenant' is smaller than the effect of an advisor on lease incentives given by landlords, this difference is not statistically significantly different. Given the considerable costs of hiring an advisor, typically much more than the 2 percentage point difference in the effect on lease incentives we found for the Amsterdam office market, this result questions whether an advisor is worth hiring. However, besides potential other benefits of hiring an advisor, it seems that, in a market where information is key, market participants cannot afford not to hire an advisor. If the counterparty in a rental lease transaction has superior information, leading to an increase in information asymmetry, not hiring an advisor can have a negative impact on the acquired lease incentives.

References

Bentvelzen, S., 2012. Kantoorlocaties 2.0, Onderzoek naar locatie-effecten als gevolg van 'Het Nieuwe Werken. MRE thesis, Amsterdam School of Real Estate.

Bollinger, C., Ihanfeldt, K.and Bowes, D., 1998. Spatial Variation in Office Rents within the Atlanta Region, Urban Studies 35, 1097-1118.

Bond, S., 1994. Rental Valuations with Inducements: An Update. Where Are We and Where Are We Headed?, Journal of Property Valuation and Investment 12, 7-18.

Boots, R., 2014. The intransparency of the Amsterdam Office Market – the underlying incentive and effective rental price development. Master Thesis TU Delft Real Estate & Housing.

Buitelaar, E., 2015. Kantorenleegstand, incentives en huurprijzen, Research paper ISSN 1878-4607, Amsterdam School of Real Estate ASRE.

Brennan, T., Cannaday, R., Colwell, P., 1984. Office Rents in the Chicago CBD, Journal of the American Real Estate and Urban Economics Association, 12: 3, 243-260.

Brounen, D., & Jennen, M., 2009b. The Effect of Clustering of Office Rents: Evidence from the Amsterdam Market, Real Estate Economics 37, 185-208.

Can, A., Megbolugbe, E, I., 1997. Spatial Dependence and House Price Index Construction, Journal of Real Estate Finance and Economics 14, 203-222.

Casetti, E., 1997. The Expansion Method, Mathematical Modeling, and Spatial Econometrics, International Regional Science Review 20, 9-33.

Clapp, J.M., 1993. Dynamics of Office Markets, Empirical Findings and Research Issues, Journal of the American Real Estate and Urban Economics Association, No.1.

Clapp, J.M., 2003. A Semiparametric Method of Valuing Residential Locations: Application to Automated Valuation, Journal of Real Estate Finance and Economics 27, 303-320.

Clapp, J. M., 2004. A Semiparametric Method for Estimating Local House Price Indices, Real Estate Economics 32, 127-160.

Cervero, R., Duncan, M., 2002. Transit's Value Added: Effects of Light Commercial Rail Services on Commercial Land Values, Paper presented at the 2002 TRB Annual Meeting.

Colwell, P.F., Munneke, H.J., Trefzger, J., 1998. Chicago´s Office Market: Price Indices, Location & Time, Real Estate Economics 26, 83-106.

Colwell, P. F., Munneke, H.J., 2006. Bargaining strength and property class in office markets, Journal of Real Estate Finance & Economics 33, 197-213.

Dunse, N., Jones, C., 1998. A hedonic price model of office rents, Journal of Property Valuation and Investment 16, 297–312.

Fisher, J., Gatzlaff, D., Geltner, D., Haurin, D., 2003. Controlling for the Impact of Variable Liquidity in Commercial Real Estate Price Indices, Real Estate Economics 31, 269-303.

Frew, J., Judd, D., 1988. The Vacancy Rate and Rent Levels in the Commercial Real Estate Market, Journal of Real Estate Research 3, 1-8.

Fuerst, F., 2007. Office Rent Determinants: A Hedonic Panel Analysis, Working paper, available at SSRN.

Genesove, D., Mayer, C.J., 1997. Equity and Time to Sale in the Real Estate Market, American Economic Review 87, 255-269.

Garmaise, M.J., Moskowitz, T.J., 2004. Confronting Information Asymmetries: Evidence from Real Estate Markets, The Review of Financial Studies 17, 405-437.

Gu, A. Y., & Colwell, P. F., 1997. Housing rent and occupational rank in Beijing and Shenyang, China, Journal of Property Research 14, 133–143.

Harding, J.P., Rosenthal, S.S., Sirmans, C.F., 2003. Estimating Bargaining Power in the Market for Existing Homes, The Review of Economics and Statistics 85, 178-188.

Hendel, I., Nevo, A., Ortalo-Magné, F., 2009. The Relative Performance of Real Estate Marketing Platforms: MLS versus FSBOMadison, American Economic Review 99, 1878-1898.

Ho, D. G., Newell, Walker, A., 2005. The importance of property-specific attributes in assessing CBD office building quality, Journal of Property Investment and Finance 23, 424-444.

Howe, J.S., Shilling, J.D., 1990. REIT Advisor Performance, AREUEA Journal 18, 479-500.

Hough, D., Kratz, C., 1983. Can 'Good' Architecture Meet the Market Test?", Journal of Urban Economics 14, 40-54.

Hunter, W.C., Jagtiani, J., 2003. An analysis of advisor choice, fees, and effort in mergers and acquisitions, Review of Financial Economics 12, 65-81.

Jefferies, R. L., 1994. Lease Incentives and Effective Rents: A decapitalization Model, Journal of Property Valuation & Investment 12, 21-42.

JLL, 2016. Office Outlook United States Q4 2015, JLL research. Jones Lang Lasalle IP, INC 2016.

Kennan, J., Wilson, R., 1993. Bargaining with Private Information, Journal of Economic Literature 31, 45-104.

Koppels, P. W., Keeris, W. G., 2006. Office vacancy types and lease incentives; exploration by means of rental adjustment equation, Paper presented at the European Real Estate Society, Weimar.

Kuang, P., 2014. A model of housing and credit cycles with imperfect market knowledge, European Economic Review 70, 419-437.

Levitt, S.D., Syverson, C., 2008. Market Distortions when Agents are Better Informed: The Value of Information in Real Estate Transactions, The Review of Economics and Statistics 90, 599-611.

Merlo, A., Ortalo-Magné, F., 2004. Bargaining over residential real estate: Evidence from England, Journal of Urban Economics 56, 192-216.

Mills, E., 1992. Office Rent Determinants in the Chicago Area, Journal of the American Real Estate and Urban Economics Association 20, 273-287.

Moll, S., 2012. Amsterdam Office Rent Determinants During Distinct Periods of a Market Cycle, Master Thesis, University of Amsterdam, Amsterdam.

Munneke, H.J., Yavas, A., 2001. Incentives and Performance in Real Estate Brokerage, Journal of Real Estate Finance and Economics 22, 5-21.

Nitsch, H., 2006. Pricing location: a case study of the Munich office market, Journal of Property Research 23, 93-107.

Ontwikkelingsbedrijf Gemeente Amsterdam, 2006. Minder Kantoorplannen; Aanbevelingen voor het ingrijpen in het planaanbod van kantoren in Amsterdam.

Rutherford, R.C., Springer, T.M., Yavas, A., 2005. Conflicts between principals and agents: evidence from residential brokerage, Journal of Financial Economics 76, 627-665.

Shilton, L., Zaccaria, A., 1994. The avenue effect, Landmark Externalities and Cubic Transformation: Manhattan Office Valuation, Journal of Real Estate Finance and Economics 8, 151-165.

Sivitanidou, R., 1995. Urban Spatial Variation in Office-Commercial Rents: The Role of Spatial Amenities and Commercial Zoning, Journal of Urban Economics 38, 23-49.

Slade, B., 2000. Office Rent Determinants During Market Decline and Recovery, Journal of Real Estate Research 20, 357-380.

Van Gool, P., 2011. Moet een belegger wel huurincentives geven? (Should investors offer lease incentives?), ASRE working paper 2011.

Wheaton, W., 1984. The interjurisdictional Differences in Commercial Property Taxes, National Tax Journal 37, 515-527.

Wheaton, W., Torto, R., 1988. Vacancy Rates and the Future of Office Rents, Journal of the American Real Estate and Urban Economics Association 35, 430-436.

Wheaton, W.C., 1990. Vacancy, Search, and Prices in a Housing Market Matching Model, Journal of Political Economy 98, 1270-1292.

Appendix

A. Description of main data sources

1. Building database TU Delft

TU delft gathered the hedonic characteristics of office buildings in Amsterdam. These are mainly building-specific and location-specific variables like the google walkscore, construction and renovation year and the number of floors.

2. GIS data – Arcgis

We have used GIS program to calculate the walking distance to the nearest station and travel time to the ramp of the nearest highway. The walking distance is a better measure than the distance by car, which has been used in previous research (see Boots, 2014). Moreover, we did not use the distance to the ramp of the nearest highway, but the travel time as distance can be equal, but travel times can differ substantially.

3. Amsterdam tax authority (DBGA)

DBGA collects transactions data of rental agreements as part of the law WOZ (translated: 'valuing real estate'). To determine the value of a real estate object they send a questionnaire to new tenants of a building. This mains that extensions of existing rental agreements are not registered. In the questionnaire information is asked about incentives, square meters, number of parking places, and the lease term.

4. Basisregistratie Gebouwen en Adressen (BAG)

The BAG (Basis registration addresses and buildings) contains information about all adresses and buildings in a municipality. This information is publicly available and contains data on the size of the real estate object, the construction year, and whether the object is in use.

5. Cushman & Wakefield

Cushman & Wakefield is a real estate advisor that collects all of the relevant information about the Amsterdam (and other) office market and analyses that information (market reports). Market information about Amsterdam, including transactions data of transactions that were guided by Cushman & Wakefield, were made available for this study.

6. Strabo

Strabo is a research company that is specialized in market research and real estate information. They have a transactions information system (called VTIS) which contains, amongst others, all of the relevant information about transactions of offices in Amsterdam. This is also based, in part, on information from PropertyNL and de Vastgoedmarkt. The database also contains information whether an advisor was involved with the transaction for either the landlord, tenant, or both.