

# **DISCLOSURE DURING LEASES: INFORMATION AND ENERGY EFFICIENCY IN COMMERCIAL OFFICE WORKSPACES**

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## **ABSTRACT**

Economic principal-agent theory underpins the sharing of energy efficiency information between a landlord and tenant of a commercial office building for the purposes of mitigating energy efficiency investment market failure. This disclosure can occur prior to, and during a commercial office workspace lease contract. When the tenant is the beneficiary of that investment from lower energy costs, disclosure ex-ante theoretically mitigates the adverse selection of a landlord underinvesting in energy efficiency. Continuing to disclose that ex-ante rating during a lease, theoretically mitigates the moral hazard of a landlord undermaintaining the level of energy efficiency disclosed at the start of the lease. Mandatory ex-ante disclosure policies, such as the Australian Commercial Building Disclosure program, do not, however require disclosure during leases.

With the larger objective of informing disclosure policy, this paper explores the effects of disclosure during leases, as anticipated principal-agent theory. Two workspace case-studies are analysed. Consistent with the theory, the disclosing case had maintained its relatively high rating, while the non-disclosing case energy efficiency had deteriorated. In addition to the theory, and confirming quantitative literature, the marketing benefits of disclosing ex-ante were perceived to accrue only to highly rated buildings. Disclosure during leases was perceived to be useful for benchmarking, and residual underinvestment in the disclosing case was attributed to the coarse granularity of the disclosure metric.

Keywords: Leases, Principal-agent Theory, Energy-efficiency, Information asymmetry, Disclosure

## INTRODUCTION

Given that most of the world's buildings are not new, it is the reduction of the energy used in existing buildings that can have the greatest impact upon reducing the global carbon footprint of buildings (Yaron and Noel 2013; Deng et al. 2014; Kolokotsa and Santamouris 2014). One strategy to reduce carbon emissions is to improve the energy efficiency of commercial office buildings (Hong et al 2015).

Energy efficiency refers to consuming less energy while providing the same level of services or useful output (Patterson, 1996). Barriers to investing in the energy efficiency of commercial office buildings include principal-agent problems that have been described as the “landlord-tenant” problem or “split-incentives” (Economidou 2014).problems.

A principal, contracts with an agent, to act on its behalf. Problems occur when that principal and agent have differing incentives and differing access to information (Eisenhardt 1989). Applied to an investment in a commercial office building, the principal is the tenant who rents a commercial office workspace, and the agent is the landlord who provides the tenant with a workspace on his behalf. When the landlord is the investor in energy efficiency but the tenant the beneficiary, that landlord lacks the incentive to invest. The result is “underinvestment”, meaning levels of investment below that which is pareto-optimal. The remedy for such energy efficiency market failure is information (Allcott and Greenstone 2014).

“Disclosure” here refers to the sharing of information about a building, or a workspace tenancy contained within that building, between landlord and tenant. The disclosure of an energy efficiency or eco-certification rating prior to a lease (henceforth ex-ante disclosure), theoretically mitigates the principal-agent problem of adverse selection (Acil Allen 2015). Continuing to disclose that eco-certification rating during the leases theoretically mitigates the principal-agent problem moral hazard, here being that of the landlord failing to maintain the rating the building achieved at lease commencement.

There are numerous international ex-ante disclosure programs and a large body of literature including that by Fuerst and McAllister (2011) identifying their negligible affects, as a signal of future energy costs, upon eliciting sales and lease premia. There has, however been little, or none this researcher could find, into the effects of continuing to disclose ex-ante ratings ex-post. With the larger objective of informing disclosure policy, this paper aims to fill that gap by exploring, qualitatively through case-study thematic analysis, disclosure during leases.

## LITERATURE REVIEW

A body of empirical work measures principal-agent problems between landlord and tenant using a common method. It compares levels of energy performance in a tenure type susceptible to a principal-agent problem, with energy performance in a tenure type not susceptible to that problem, such as owner-occupancy. Energy performance is either a change in the measure of energy efficiency, or in energy consumption. A measure of energy consumption is one from which a calculation of energy efficiency can be made, while controlling for the level of service provided.

In the residential sector, Gillingham et al. (2012) found that Californian homeowners who paid to heat their homes themselves are 20 percent more likely to invest in energy efficiency, and insulate their ceilings than were those tenants whose heat was included in a contract gross with energy utilities. Furthermore, they found that those who paid for their own energy were 16 percent more likely to change their heat settings at night to lower their energy consumption. In the commercial sector, Jessoe et al. (2019) found that those firms who paid for their own electricity used 14 percent less electricity energy than those whose energy utilities were included in their lease contracts.

A distinction needs to be made between two different principal agent problems because each has a different disclosure remedy. Molho (1997) describes the problem of adverse selection as one of pre-contractual opportunism. In our case that contract is a commercial office workspace lease. If ex-ante, a prospective tenant knows less about the energy efficiency of the base-building than does a prospective landlord, then theoretically, that landlord lacks the incentive to invest in that building's base-building energy efficiency at pareto-optimal levels.

Not knowing whether the building has above average energy efficiency, a sufficiently sceptical prospective lessee will be prepared to pay no more than average for that energy efficiency. The prospective lessor anticipating as much, will in turn, not be prepared to invest more than average in energy efficiency. And if this process is repeated, in the manner described by Akerlof (1970) then the market becomes filled with "lemons." Removing the information asymmetry by disclosing ex-ante theoretically arrests the downward moving average of energy efficiency.

A market full of energy inefficient commercial office-building "lemons" is a matter of collective concern. Consequently international government and non-profit organisations have stepped in with mandatory and voluntary programs for the "disclosure" of building and workspace energy efficiency information, ex-ante.

In Australia, most commercial office leases are net of both base-building and tenancy energy utilities (Property Council 2015). The tenant pays for tenancy energy, including lighting, tenancy package heating, ventilation and air-conditioning (HVAC) and plug loads, direct to the energy utilities company. The tenant also pays for their pro-rated share of base-building energy, that is energy used to power the central building services, HVAC, common area lighting and power, “passed-through” with the rent bill from the landlord. If the tenant suffers information asymmetry ex-ante as to the energy efficiency of the base-building, then this theoretically can lead to adverse selection.

Mitigating adverse selection is an explicit objective of Australia’s mandatory ex-ante disclosure program (Acil Allen 2015). Under the Australian Building Energy Disclosure Act (2010) a commercial building with a workspace greater than 1000 square meters of net lettable area (NLA) must disclose either a base-building National Australian Built Environment Rating System (NABERS) energy efficiency star-rating, or a whole building NABERS star-rating, prior to the sale, lease or sublease. The energy efficiency rating measure of energy consumption controlling for net lettable area, climatic region, occupancy hours and numbers of occupants. A certified assessor awards a star rating of between 0.5 to 6.5, in 0.5-star increments and issues the building owner with Building Energy Efficiency Certificate (BEEC) valid for 12 months. During the 2017 study period in the Australian state of New South Wales, the location of the two cases described in this research, 4% of buildings achieved a 0 star rating, 1% 1 star, 2% 2 stars, 2% 2.5 stars, 6% 3 stars, 8% 3.5 stars, 13% 4 stars, 32% 4.5stars, 20% 5 stars, 8% 5.5 stars, and 0% 6 stars. (NABERS Annual Report 2017).

The main subject of this paper is the second principal-agent problem theoretically implicated in the underinvestment in the energy efficiency of commercial office building workspaces during the lease Molho (1997) describes moral hazard as stemming from post-contractual opportunism. In our case, if the tenant does not know whether the landlord has maintained or improved the energy efficiency of the base-building to the levels agreed upon at lease commencement, then that landlord lacks the incentive to continue to invest in, or maintain, that energy efficiency.

During leases, base-building’s energy efficiency can be maintained or improved through retrofit and/or facilities management practices. A retrofit involves investing in the improvement of the fabric and systems of a building with the primary intention of improving energy efficiency and reducing carbon emissions (Ali and Rahmat 2009). Investing in facilities management practices can

also have a significant effect upon energy performance. For example, Derrible and Reeder (2015) find that the cost of over-cooling during the operation of commercial buildings in the United States resulted in losses of 8 percent.

The theoretical remedy for moral hazard is also information disclosure, but this time during the lease. Principal and agent can agree to terms in the contract requiring the observation and monitoring of behaviour and the sharing of the information created. When observed actions occur, contract terms are triggered (Faure-Grimaud 2001) based upon a menu of options (Fudenberg and Tirole 1990). Both parties are incentivized to agree to this observation, monitoring and disclosure, because it involves the sharing of risk (Hölmstrom 1979; Hart 1995). In our case landlord and tenant can agree upon the base-buildings NABERS rating in the lease, and to repeat assessment disclosure of the during the lease.

During a lease net of energy utilities, a tenant does not need disclosure policy to be made aware of a change in the base-building energy consumption costs because they can see that increase in energy costs their prorated share of base-building energy utility bills. And while it is theoretically possible for landlord and tenant to agree to an expense stop above which the landlord starts to pay for base-building energy efficiency, the setting of such expense stop involves solving an optimisation problem, and one whose solution is, currently, not readily available to landlords and tenants(although possibility of making is so is an interesting avenue for further research) Energy consumption data differs from an energy efficiency rating in that it does not account for the level of service provided. Reassessing and continuing to disclose that energy efficiency rating, during the lease enables a tenant, who might change its occupancy levels, or occupancy hours, to benchmark with the energy efficiency of the base-building at the start of the lease and with other buildings in the market.

Under Australia's mandatory ex-ante disclosure program it is not mandatory to keep current the BEEC certificate that discloses the base-building NABERS rating and to continue to disclose throughout the term of the lease, although, as it is stated on the BEEC website (CBD 2019), firms may voluntarily decide to do so. During study period of this research, that is the calendar year ending 2017, while 1103 unique buildings under CBD were given a BEEC (CBD 2017), there were 1297 buildings with a current NABERS rating (NABERS 2017). Some of the buildings with a current BEEC had had one before.

It is not possible to tell from these statistics what proportion of BEEC maintaining buildings had to renew their certificate mandatorily, triggered by other leases in a multi-tenanted building being offered to the market, and how many had kept the BEEC current for the benefits of mitigating the moral hazard of under-maintenance of base-building energy efficiency by the landlord. That avenue of inquiry into might be a topic for future research in other jurisdictions with mandatory ex-ante disclosure, if the required data is available. This qualitative paper, instead, as a possible precursor to such quantitative research, uses case-study thematic analysis to explore the effects of disclosure during leases, as anticipated by principal-agent theory and in addition to that theory.

## **RESEARCH METHOD**

Case-study thematic analysis of two commercial office workspace cases “W” and “T” is conducted under a pluralist research paradigm. Through analysis themes emerge that describe phenomena (Daly et al, 1997). A case-study examines a single example of a class of phenomena. Its usefulness lies in the preliminary stages of an inquiry, when it can provide hypotheses to be tested with a larger number of cases (Abercrombie and Hill 1984). The findings of case-study analysis are significant if they lead to future research. The limitations of this method is the generalizability of the findings it produces (Hamel 1993), but this depends upon how the findings are interpreted by the case study’s reader (Stake 2005). Using more than a single case enables contrasts and extensions (Yin 1994).

### **Case selection**

Both cases were selected as being pertinent to the theme of disclosure during leases, from a larger set of cases used in the author’s PhD dissertation. Both cases are located in the Australian state of New South Wales, and in the jurisdiction of the Australian mandatory ex-ante CBD disclosure program. Both cases have workspaces of greater than 1000 square meters, and so are above the area of the Australian CBD mandatory ex-ante disclosure threshold. The physical context of each workspace case is the commercial office building in which the workspace is located. A commercial office building is accepted to be one in which a least 75 percent of its net lettable area (NLA) is comprised of commercial office space, as is the requirement for its inclusion in the CBD program (CBD 2017). Both W and T are also similar in that they are occupied on long leases of a decade or more. This is relevant because it is assumed that any underinvestment in energy efficiency over long leases is likely more apparent than it would be over short leases. They were also similar in that the workspaces they accommodated occupied the entire commercial office NLA and the sole tenants in their buildings during their first long leases that had started prior to the introduction of

mandatory disclosure in Australia in 2011. This meant that neither had had to mandatorily disclose their base-building energy efficiency rating ex-ante, nor had this disclosure been triggered by the leasing of another tenancy, as would be have been the case under the current Australian law, had they been the occupants of multi-tenanted buildings during their long leases.

Both cases also had an assessed building rating at lease end, that is during the study period. T's tenant, after its long first lease without disclosure, handed back some of its space to the landlord four years prior to the study period. That landlord then leased the surfeit space to other tenants and so triggered the base-buildings first mandatory NABERS rating. This meant that T's energy efficiency rating, while not disclosed prior to either the original lease, or at lease renewal, was available for case-study analysis.

The two cases differed in terms of whether they had disclosed voluntarily during their first long leases. W's landlord and tenant had agreed voluntarily to disclose ex-ante and ex-post, renewing the BEEC annually while T's landlord and tenant had not.

### **Data sources**

This case-study thematic analysis involves the triangulation of data from three different sources.

The first data source was gathered through an online survey data sent to the facilities management firm, and conducted under a post-positivist research epistemology. It is assumed that this data reflects an objective reality independent of this researcher's viewpoint (Hudson and Ozanne 1988). The survey used commercial "SurveyMonkey" online tool. Online surveys were chosen because they were a reliable way to collect information geographically distributed buildings ahead of the site visit. The surveys provided numerical energy consumption data, assessed NABERS ratings, and categorical, descriptive data.

The second data source was from interviews held with the workspace facilities managers themselves, held within those workspaces, and conducted under an interpretivist research epistemology. These interviews were interdependent, interactive, and aimed at identifying the facilities managers' experiences and gaining an understanding as to their knowledge. The facilities managers are assumed to be both unique, and also representative of a larger group (Lincoln and Guba, 1985).

W's facility manager was responsible for both base-building and the tenancy facilities management. T's Facilities manger 1. managed the tenancy services, and T's Facilities manager 2. was the building engineer who managed the tenancy building systems and services.

The third data source were notes and photographs taken by this researcher, on tours of the workspace. On these tours, additional comments and observations, including those of other building occupants and staff encountered were also noted, but not recorded, due to background noise difficulties. The premise behind such a pluralist research design is that neither qualitative nor quantitative data is sufficient (Tashakkori and Teddlie 1998) and that both co-exist in the interpretation (Ivankova et al. 2007).

In the cases below, this author's questions asked during the semi-structured interviews are denoted with a Q. The facilities managers' answers and volunteered knowledge is in *italics*, and any clarification and contextualisation of comments is in *[brackets]*.

### **Case “ W”**

The W workspace is leased in a 15-storey high purpose-built building constructed 9 years prior to the study period. On completion by a developer working on behalf of the current tenant, it was sold to a Real Estate Investment Trust (REIT) and then leased back to the occupant on a 15-year lease. W leases the building's single commercial office workspace of 23,000 square meters NLA, but not the retail space at street level. The building is occupied 20% or more for 55 hours per week. W's tenant expects to remain in the building for the foreseeable future. The lease contains a make-good clause, which can be assumed some financial disincentive to any retrofit investments that have a payback period longer than, during the study period of 2017, the remaining 6 years of the 15-year lease term.

What is “*unusual*” about W, according to the facilities manager, is that company he works for, provides both the base-building, and the tenancy facilities management services under one combined contract. It is “*much more common*” he said, for there to be one facilities management company responsible for the base-building and another for a tenancy, particularly if the workspace is of significant size or complexity. This facilities manager, representing both landlord and tenant, was well positioned to perceive any principal-agent problems, and the benefits of disclosing during leases, acting as he does for both.



The landlord, the REIT, does have a separate agent, a real estate company, for lease negotiations. This, the facilities manager described, was necessary because, had the facilities management company also negotiated the lease, *“we may not be driving the hardest deal...if we represent both landlord and tenant.”*

W’s tenancy’s particularly energy intensive features include supplementary HVAC package plant, an operational control center with its uninterrupted power supply (UPS), a staff restaurant and full kitchen, a cool room and a blackwater recycling plant in the basement.

The base-building’s many energy efficient attributes include horizontal, external sunshades to the north, vertical external sunshades to the east and west, energy efficient lighting ballasts, movement sensors and timers which turn off lights when not in use, newly installed LED lighting in the fire escapes, and rooftop solar photovoltaics owned by a third party that supplies energy to the under a power purchase agreement. The facility manager also runs an energy efficiency base-building HVAC tuning program to maintain the system at design-specified levels.

The facilities manager thought the base-buildings 5-star NABERS rating was a true reflection of its energy efficiency *“Yes, it is a highly energy efficient building.”* The rating, he thought would be yet higher, if the building contained less than the two floors dedicated to the organisations senior executives *“Up there, [on the executive level] there are not so many people on the floors, and we are lighting and heating all the time... it is very inefficient” [and so lowers the NABERS rating].*

Immediately after construction, the building was awarded a high construction eco-certification rating. Two years later, when the CBD energy efficiency disclosure program became mandatory, the landlord and tenant decided to acquire a NABERS rating, although they had not been required to do so mandatorily as the building had not been offered for sale or lease. This disclosure was voluntary in terms of it not being required by the CBD program, but nevertheless, once it had been agreed to in the lease, required of the landlord. W’s base-building energy consumption is measured and monitored monthly and its BEEC renewed each year. W’s base-building has since maintained its relatively high (NABERS 2017) 5-star NABERS rating throughout the lease.

While this rating had been maintained, it had not been improved. The landlord had, immediately prior to the study period, agreed to put money into a capital expenditure budget for energy efficiency improvements, and there had been the recent expenditure on improve the energy efficiency of the lighting in the fire escapes, this had not resulted in the base-building NABERS rating being increased.

The facilities manager identified some residual underinvestment:

*“There is some room for improvement with the lighting [install newer LED’s] and there is space for [more] photovoltaics on the roof and terrace.”*

The current roof top photovoltaics are managed through a power-purchase agreement with a third party. The landlord, a large REIT, had negotiated a large portfolio wide energy and telecommunications contract. This contract precludes the introduction of an intermediary and its power-purchase agreement for new photovoltaics that would improve W’s base-building’s energy efficiency.

The facilities manager described the differing incentives that lead to principal-agent problems

*“the tenants ask for it [energy efficiency improvements] and the landlord “is not too interested... We present it to them at quarterly meetings. We find that out when we ask them to pay for improvements.”*

**Q.** What do you see as being the benefits of NABERS?

Describing disclosure’s marketing benefits the facilities manager responded:

*“Depends on who you are talking to...based on experience ... it is useful when you sell it. Good that the building can achieve it... it was probably useful to the developer [in getting the sales price].”*

W’s tenant publicised their green credentials including the blackwater water recycling system in the basement. This system was included in tenants marketing literature despite it drawing an extremely high energy load.

**Q.** How about for the tenant? What are the benefits of NABERS for operations?

*“It is useful... as a benchmark... I can find out if there is a spike [in energy consumption].”*

**Q.** What if it was less than 5 stars? What if you had a low rating?

*“Doesn’t sound too good.”*

When asked he attributed the residual underinvestment during the lease to the usual push and pull of the landlord and tenant seeking to leverage value from one another. Understanding the direction of the question, and obviously familiar with the concept, the facilities manager stated:

*“Yes... there is a landlord-tenant problem.”*

## Case “T”

T’s interviews were conducted with two tenancy facilities managers. Facilities manager 1. is front-of-house and deals with accommodation, restaurants and meeting rooms. Facilities manager 2. manages the building services, notably maintaining the continuous operation of the tenancy’s Heating Ventilation and Air Conditioning (HVAC).

T is a workspace occupying all the commercial office space in a 4-storey building located in a suburban office park. It was constructed 15-years prior to the commencement of the 2017 study period, that is 5 years before W, at which time the T’s tenant leased the entire building on a 10-year lease. The building has predominantly open plan office space, 3 levels of basement carparking, a café, a restaurant, and meeting rooms on the ground floor. Like W, T’s building is owned by a large REIT who purchased it upon construction completion but unlike that of W, it was not purpose built for its tenant nor sold and leased back. T’s tenant then took naming rights, and leased the entire net lettable area (NLA) of available commercial office space. T’s tenant runs its Australasian headquarters from the building. The building is occupied 24 hours a day for 7 days each week. The workspace is extremely densely occupied. There are more employees than workstations. Approximately 60% of the staff are at unassigned workstations.

T’s tenant remained the building’s only occupant until the lease was renewed just prior to the study period. At that time one floor of the building was handed back to the owner who then let it to other tenants. This triggered mandatory ex-ante disclosure and the building earned a below the Australian state of New South Wales’s average 4-star base-building NABERS rating. This means that both times T was negotiating its lease, it did so absent an ex-ante disclosed base-building rating, theoretically exposing T’s lessees to adverse selection on two occasions.

Tenancy energy intensive features include two additional air handling units serving internal meeting rooms and communications rooms with file servers on each floor. There is an uninterrupted power supply to ensure that these tenancy HVAC units maintain the file server rooms within critical set points. Facility manager 2 described a large part of his job was ensuring critical business continuity by maintaining the file server HVAC. Business continuity is of the highest priority.

The base-building contains no energy efficient LED light fixtures, and no photovoltaics despite the large flat roof being well suited to them. The building has four glass facades, indifferent to orientation or path of the sun.

The westerly elevation is completely unshaded by trees, adjacent buildings, or external sunshades. Facilities manager 2 said he had “*taken temperatures of 70 degrees*” [Celsius] on the surface of the glass on that elevation during summer. This, he said, puts huge demands on HVAC to maintain cooling, particularly because the base-building’s “*chilled water is at capacity.*” He described how they had put up panels inside along the western elevation to block the sun. These sunshades are much less effective than external shading, and still let the heat through the glass. And while they made operations on these days possible by reducing the load on the at-capacity central HVAC plant somewhat, they had also made the space very dark and increased the need power for supplementary lighting.

Facilities manager 1. described how T’s occupancy density had been steadily increasing over the lease term, until they discovered it had exceeded the capacity of the base-building HVAC system. All the staff now work at unassigned workstations and, at any point in time, only 60% of staff are working in the office:

*“If we add a single workstation, the whole floor’s HVAC needs to be rebalanced...and if we go over the amount agreed in the lease we have to pay [an extremely high] hourly rate. [for the chilled water].*

**Q.** What would you do [to retrofit to save energy] if you could?

Facilities manager 2:

*“I would do some form of [external] louvres [to lower the extreme summer heat load] there [points to westerly elevation]. We could put photovoltaic panels on the [large flat] roof [through a power purchase agreement]. I would also do something about the toilet water, put some grey water tanks in a couple of car spaces in the basement.”*

Although the building’s demands had steadily increased throughout the lease, and was now at capacity, the landlord had not undertaken any measures that would reduce the load on the system.

**Q.** Do you know your base-building NABERS rating?

Facilities Manager 1. “*Nup...hold on a minute.*” He calls the remote, landlord base-building facilities manager who rings him back: “*4-stars*”.

The recently acquired NABERS rating, while not withheld, had not been made known to the tenancy facilities managers, nor used by them for benchmarking operations. This led to a question of benchmarking by other means.

**Q.** Do you track base-building energy consumption and other data through the building management systems (BMS)?

Facilities Manager 2.

*“They [the landlord] control the BMS ...remotely. We don’t have any input. No access to the BMS...Yes. It would be a useful thing. “*

**Q.** How about informal communication between you and the base-building facilities manager?

Facilities Manager 2. *“We depend upon that.”* He then described how, when the base-building HVAC system went down, he took remote instructions from the base-building manager and worked overtime to repair it. No money was exchanged between landlord’s and tenant’s facilities managers, however they worked together to maintain critical business continuity.

*“We have the same interests. We need to look after the occupant first.”*

## **ANALYSIS**

Analysis finds themes consistent with, and in addition to those anticipated by to principal-agent theory.

### **Landlord and tenants’ incentives to invest in energy efficiency are split**

Consistent with principal-agent theory, and confirming the findings of the empirical literature reviewed, both cases provide example of split incentives.

In W’s case the facility manager had specifically described a *“landlord-tenant problem”* and that:

*“the tenants ask for it [energy efficiency improvements] and the landlord is not too interested...”*

Split incentives were also evident in workspace T’s case whose base-building was operating far below pareto-optimal levels. Occupancy intensification had steadily increased to the point where no additional workstation could be added to the tenancy without an overage being paid by the tenant for the chilled water to the landlord. But the landlord lacked any incentive to respond to these increasing demands by increasing base-building energy efficiency. It had not, as Facilities Manager 2. had suggested, added external sunshades to reduce peak load in summer on the westerly elevation, or added photovoltaics on the large flat roof to reduce energy drawn through the electric utility. Had the landlord undertaken these investments it would not have only benefitted the tenant,

but would actually have disbenefitted the landlord: reducing their incidence of being paid for the chilled water overage.

### **Sale and Leaseback: When the principal becomes the agent and the agent becomes the principal**

At the time W was offered to the market for sale and lease-back, the principal and agent, landlord and tenant, were in reverse roles. The REITs was first the principal who contracted with the current lessees, the agents, to develop them a building's they could buy and lease out. Once sold and leased back, the tenant became the principal contracting with the landlord REITs acting as an agent to provide them with workspaces.

Both parties anticipated this role reversal. Consequently both parties were, principal-agent theoretically incentivised to agree to bring investment energy efficiency, and other aspects of building quality, towards pareto-optimality. Both anticipated they could share in the rewards. As such, consistent with this application of the theory, construction followed immediately by sale and leaseback is a situation ideal for the sharing of risk. Both parties are incentivized to disclose both ex-ante and ex-post disclosure, and had done so in the case of W and the gap to pareto-optimality is minimized.

### **There are perceived marketing benefits of disclosing ex-ante, but only for highly rated buildings**

Another theme, in addition to those anticipated by principal-agent theory, is that ex-ante disclosure can have marketing benefits. W's facilities manager said of the ex-ante disclosure the above average NABERS rating "*it is useful when you sell it...was probably useful to the developer [in getting the sales price]*". W's facilities manager also described marketing benefits for the tenant, for whom the demonstration of being green was important, even if it lowered energy efficiency. He gave the example of the blackwater water recycling system in the basement. This system was publicised in the tenants marketing literature about the green features of building, despite the fact that the blackwater system drew an extremely high energy load.

This theme is consistent with Das and Wiley's (2014) study, which measured the efficacy of the ex-ante disclosure of voluntary United States Leadership in Energy and Environmental (LEED) rating in eliciting sales and rental premia. They found that these premia increased over time with the market acceptance of the rating system. They described these ex-ante premia, in addition to

reflecting the future operational cost savings, as the “marketing benefits” expected to accrue to the tenant.

An additional, if obvious, insight is provided by the two case studies was that marketing benefits were perceived by the facilities managers to accrue only to the highly rated buildings. W’s facilities manager said of disclosing a medium or low rating that “*doesn’t sound too good.*” T’s landlord while not actively withholding the buildings below average 4-star NABERS rating, had not made it known widely enough for the tenant’s Facilities Manager 1. to even know what it was. This may go some way to explaining the finding of the Acil Allen (2015) report that buildings in the highest quartile of energy efficiency had made the most significant improvement in their NABERS ratings four years after the introduction of Australia’s CBD program.

### **Disclosure during leases is associated with the maintenance, but not the improvement of energy efficiency**

Consistent with the theory, the disclosing case W’s landlord had maintained the above average 5-star base-building NABERS rating throughout the lease, but had not improved it by adopting any of the additional measures, recommended by the facilities manager. There had been no additional roof top photovoltaics despite the space being available. And there had been only limited conversion, in the fire escapes, to more energy efficient Light Emitting Diode lighting, despite the length of time for the net present value of the investment to reach zero being shorter than the remaining lease length. While disclosure during leases is associated with the maintenance of W’s energy efficiency, a small gap to pareto-optimality remained.

Also consistent with the theory, absent both ex-ante and ex-post disclosure, T’s below average energy efficiency had not been maintained. To block the sun coming through unshaded windows on the westerly elevation the facilities manager had put internal panels over the windows, resulting in an increase in the load drawn from the lighting and affecting a transference of load from the base-building to the tenancy energy. While such a transference supports the need for a NABERS rating that incorporates base-building plus tenancy energy (Godfrey 2020), for the purposes of this paper it is indicative of the base-buildings energy efficiency having deteriorated. T’s Facilities manager 2, without the benefits of disclosure, nor access to the BMS, said energy performance information “would be a useful thing.”

## **Coarse granularity of the rating system as a limitation**

The coarse granularity of NABERS ratings: 0.5 to 6.5 in 0.5-star increments, like the similarly coarse granularity of other international rating systems, appears as a limitation. Once it is accepted that disclosure during leases creates a) Das and Wiley's (2014) expected marketing benefits, and b) that marketing benefits only accrue to highly rated buildings, but c) cannot incentivize investment above the ex-ante disclosed level, then one reason why the additional energy efficiency investment suggestions made by W's facilities manager might not have been implemented, is not because those investments would not have closed the gap on pareto optimality, creating benefits that could be shared, but because those investments could not have moved the dial of the NABERS rating.

The coarse granularity of these rating system might be suitably representative of the degree of uncertainty in algorithms used to rate the energy efficiency, and of granularity suitable to a benchmark signal, but not be fine enough to capture the size of energy efficiency investments during leases.

## **CONCLUSION**

Analysis identified themes that are anticipated by principal-agent theory and in addition to that theory.

In W's case of sale and leaseback, the principal had become the agent, and the agent the principal. Consistent with this application of the theory both parties had agreed voluntarily to disclose both ex-ante and during ex-post. Also consistent with the theory, disclosure during leases was associated with W maintaining its relatively high rating throughout its lease, while the non-disclosing T case the energy efficiency of the base-building had deteriorated.

Themes in addition to those anticipated by the theory, and confirming quantitative literature, the marketing benefits of disclosing ex-ante were perceived to accrue only to highly rated buildings. Disclosure during leases was also perceived to be useful for benchmarking, and residual underinvestment in the disclosing case was attributed to the coarse granularity of the disclosure.

Hsu (2014) noted that disclosure policy, while being relatively inexpensive for governments to administer, places a considerable burden upon those who must comply. These findings only illustrate and contextualize the benefits of disclosure during leases as a precursor to further research. That further research may answer the question of what proportion of firms who chose to disclose during leases did so for the purpose of mitigating moral hazard, for marketing benefits or



for benchmarking. It could also explore the pareto-optimality of other cases when the principal and agent swap roles, and whether increasing the granularity of the disclosure metric would incentivize the smaller-scale energy efficiency investments possible during leases.

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