

This document contains: (1) Press Release, (2) Commentary, & (3) FAQs Responses.

MIT PRESS RELEASE
MONDAY MAY 17, 2010

**MIT commercial property price index falls another 2.4 percent in first quarter
-MIT Center for Real Estate's gauge suffers second consecutive down quarter.**

CAMBRIDGE, Mass., May 17 — Transaction prices of commercial property sold by major institutional investors fell slightly in the first quarter of 2010, according to an index developed and published by the MIT Center for Real Estate (MIT/CRE).

The 2.4 percent decrease in the transactions-based index (TBI) for the first quarter is the second consecutive negative quarter and brings it to a new low of 135.95, which is 41 percent below its mid-2007 peak of 230.26 (against an inception value of 100 in the first quarter of 1984). While the index is now almost 3 percent below the temporary bottom it achieved at the end of the second quarter last year, this difference is not viewed as significant, according to MIT Professor David Geltner, Director of Research at the Center for Real Estate. “Overall, the behavior of the index since mid-2009 is not inconsistent with a pattern of “bouncing along a bottom, essentially moving sideways”, Geltner said. While the first quarter price decline is less than the previous decline in the fourth quarter of 2009 (which was 4.9 percent), the transaction volume in the index was also down slightly. While this could be at least in part a seasonal effect, it ends a streak of three previous consecutive increases in the TBI transaction frequency.

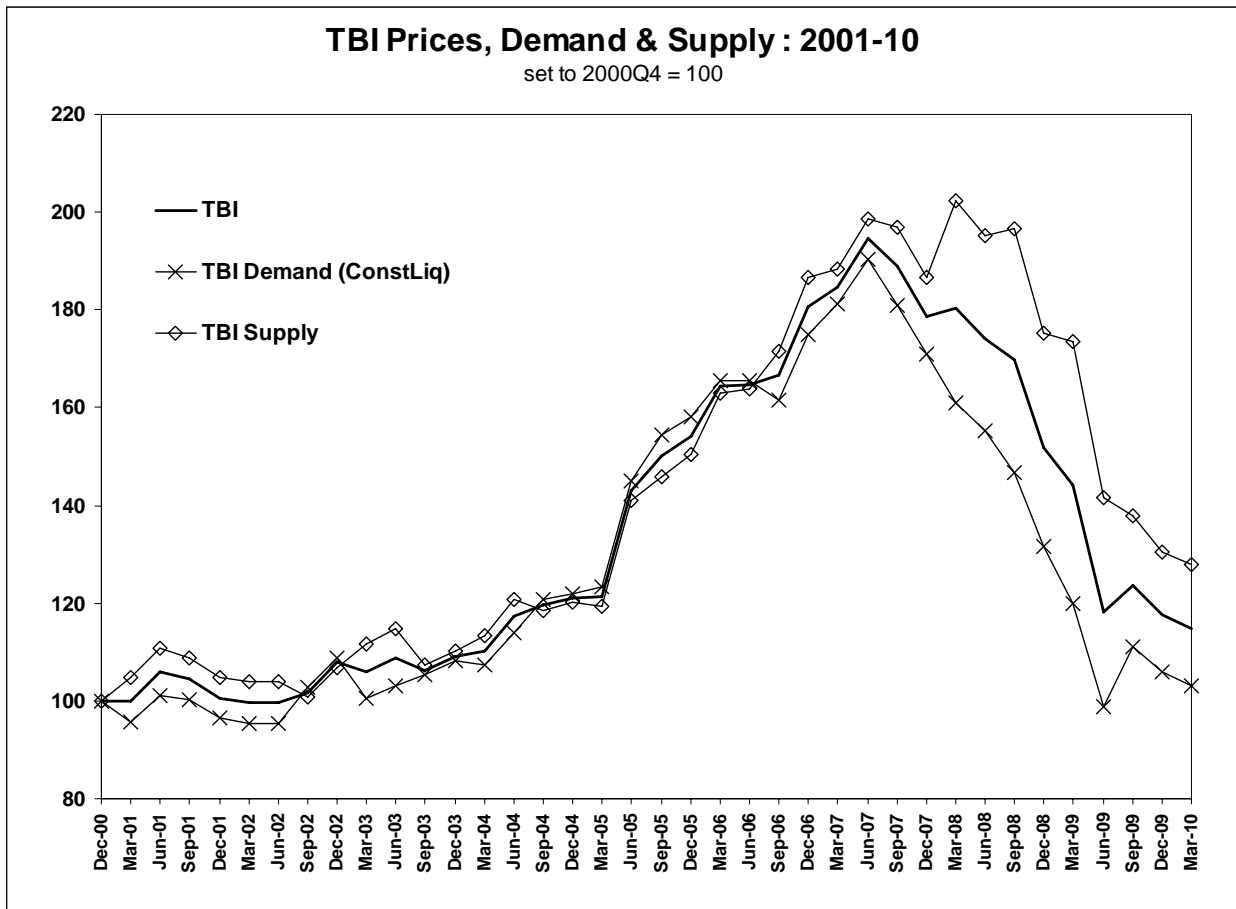
MIT/CRE publishes not only the price index based on closed deals, but also compiles indices that separately gauge movements on the demand side and the supply side of the institutional property market. The demand-side index tracks the changes in prices that potential buyers are willing to pay (sometimes called a “constant-liquidity” index of the market, because it tracks how much prices would have to change to keep a constant ability to sell as many properties at the same rate of trading volume). “The demand index can be considered a gauge of market sentiment, at least among the all-important buy-side of the market,” said Geltner. That index fell steadily for eight quarters from mid-2007 to mid-2009, to 48 percent below its peak, but then rebounded sharply up 12 percent in the third quarter of 2009. However, in the first quarter of 2010 the demand index was negative for the second quarter in a row, registering a small 2.6% drop. While this is disappointing for those looking for signs of a strong recovery in institutional property demand, it still leaves the demand index 4.4 percent above its bottom in mid-2009.

The supply-side index which gauges the prices property owners are willing to accept also was down in the fourth quarter, by a slight 2.1 percent. “This leaves the two sides of the market about as far apart as they were before”, said Geltner, “which means a much larger than historically normal gap, causing trading volume to remain anemic by historic standards.”

“Our latest results closely parallel recent results posted by another commercial property price index whose methodology was developed at the MIT/CRE: the Moody's/REAL Commercial Property Price Index – or CPPI – produced monthly by Moody's Investors Service,” Geltner noted. That index (which will be updated on May 19 by Moody's) also has dropped slightly so

far in the first quarter of 2010, though it remains slightly above its late 2009 bottom. “In general, both indices suggest a ‘sideways’ market,” with prices essentially holding at or near the bottom on average.

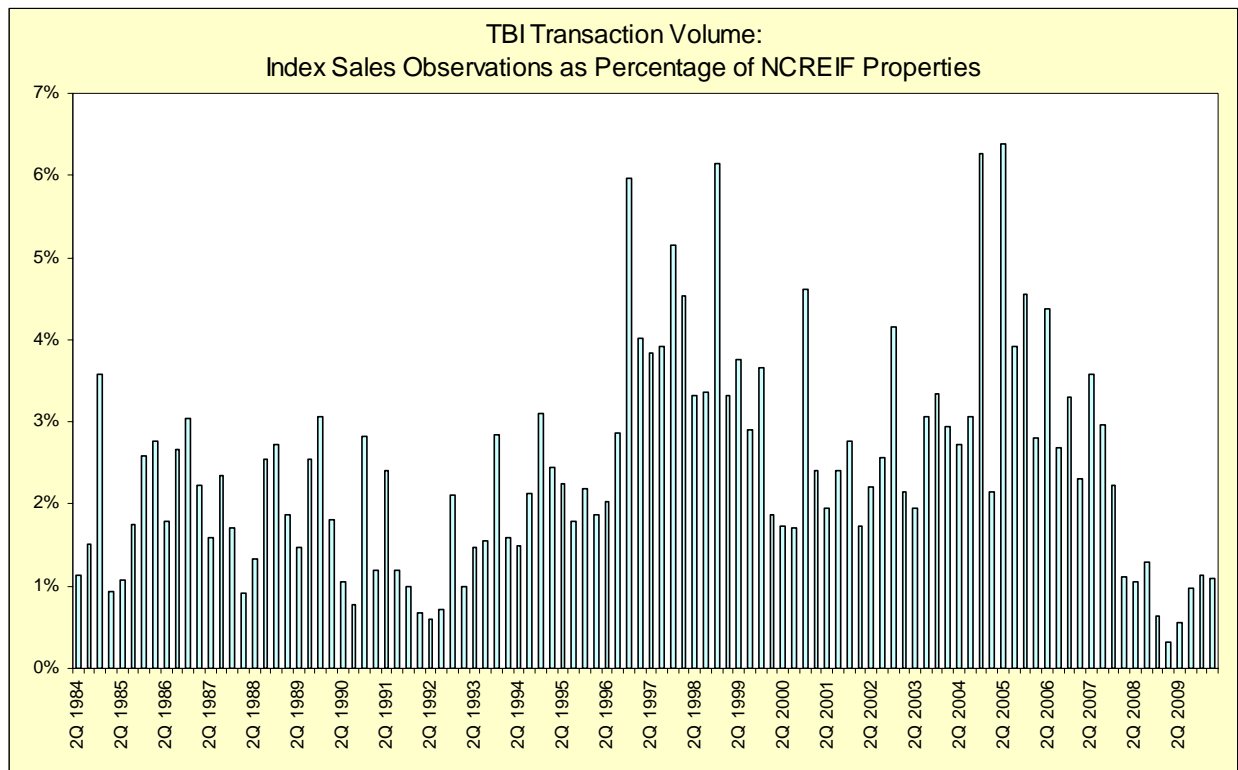
The TBI tracks the prices that institutions such as pension funds pay or receive when transacting commercial properties like shopping centers, apartment complexes and office towers. The MIT Center’s TBI is based on prices of National Council of Real Estate Investment Fiduciaries (NCREIF) properties sold each quarter from the property database that underlies the NCREIF Property Index (NPI), and also makes use of the appraisal information for all of the currently approximately 6,000 NCREIF properties. Such an index — national, quarterly, transaction-based and by property type, and tracking demand and supply as well as prices — had not been previously constructed prior to MIT’s development of it in 2006. NCREIF supported development of the index as a useful tool for research and decision-making in the industry.



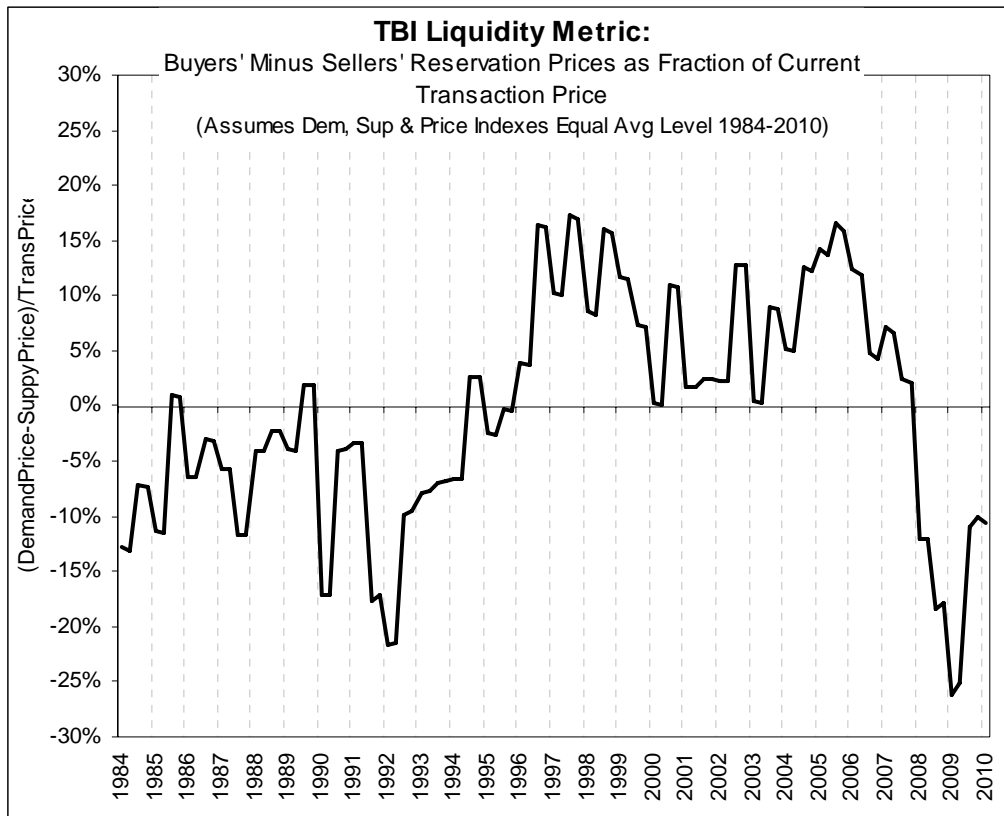
Geltner Commentary on 1Q2010 TBI Results...

-David Geltner, May 17, 2009.

As noted in the press release, the first quarter results of the TBI are a bit disappointing for those hoping for evidence of a substantial turnaround in pricing in the U.S. institutional investment property market. While the price drop of 2.4% was quite modest, it was nevertheless the second negative quarter in a row, and accompanied also by a check in the previous three quarters' tentative growth in transaction volume (at least as measured by the TBI transaction sample). Overall, the history of the index since mid-2009 suggests an essentially "sideways" market, with prices no longer significantly falling, but not gaining any lost ground either. NCREIF members may be taking advantage of the floor that has formed in the CRE market to sell some unwanted properties when they can get reasonable prices for them (by today's standards). The result can be slight down or up moves in any given quarter, even if the broad pricing level is staying largely the same.



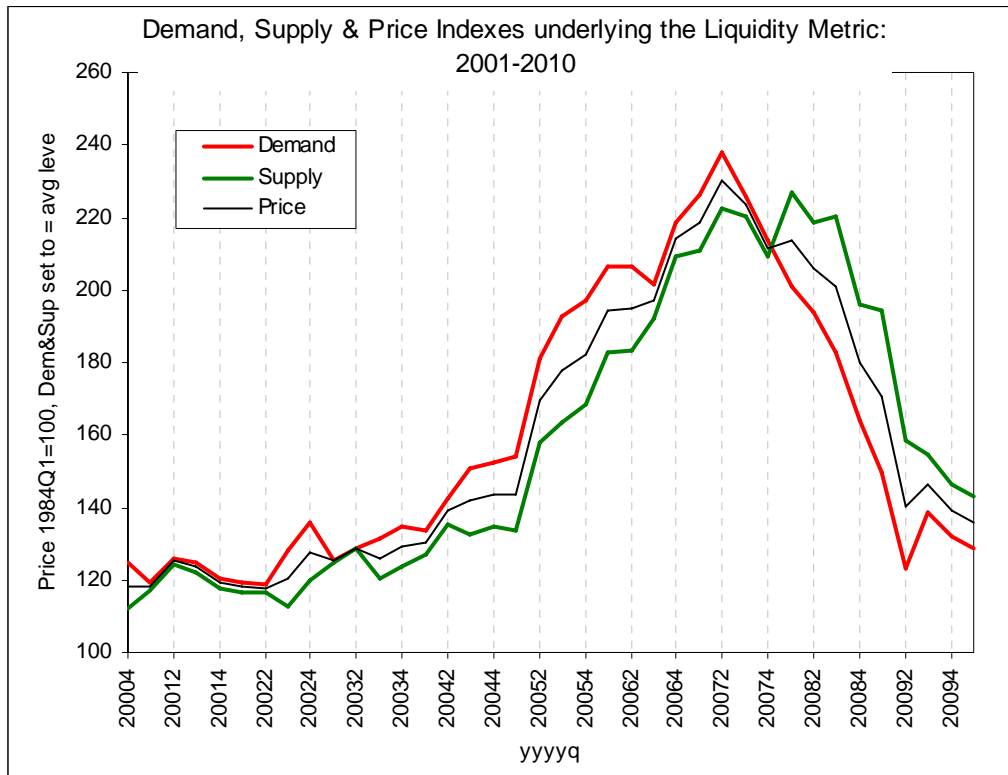
The liquidity measure that we construct from the TBI demand and supply side indices also paused in its previous improvement, dropping slightly, to a level of negative 10.5%, suggesting that a combination of sellers' reduction in their reservation prices and/or buyers' increase in their reservation prices totaling that magnitude (as a percent of average first quarter transaction prices) would be necessary to bring the market back to full normal liquidity (characterized by long-run average trading volume).*



* **Description of the “Liquidity Metric”...** This metric (which might also be considered a quantification of a type of “bid-ask spread”) is constructed in three steps. First, we take the full-history average value levels of the three indexes (price, demand, supply) based on their official starting values of 100 in 1Q1984. Label these three value levels as “P”, “D”, and “S”. Then we multiply the demand and supply index value levels at each point in history by a constant equal to the ratio P/D for the demand index and P/S for the supply index, thus giving all three adjusted indexes a full-history average value level of P. Finally we compute the relative liquidity measure each period t as: $(D_t - S_t)/P_t$, based on the index value levels each period as adjusted in step two.

The exact value indicated by this metric is therefore *ad hoc*, based on the assumption that, over the long run, the average demand-side reservation price equals the average supply-side reservation price. This assumption is reasonable, as it acts essentially as a calibrating mechanism, to define the liquidity “neutrality” point (zero bid-ask spread) to represent the long-run average amount of liquidity (average trading volume turnover) in the market (as indicated by TBI transactions). However, given the cyclicity in the real estate market this assumption will be most accurate when the total history since 1Q1984 represents a complete whole multiple of the liquidity cycle. This could be defined by a point when over the full-history the quarterly liquidity metric averages zero. Presently this average is -0.55%, suggesting that liquidity needs to increase a bit before we might freeze the history of this metric.

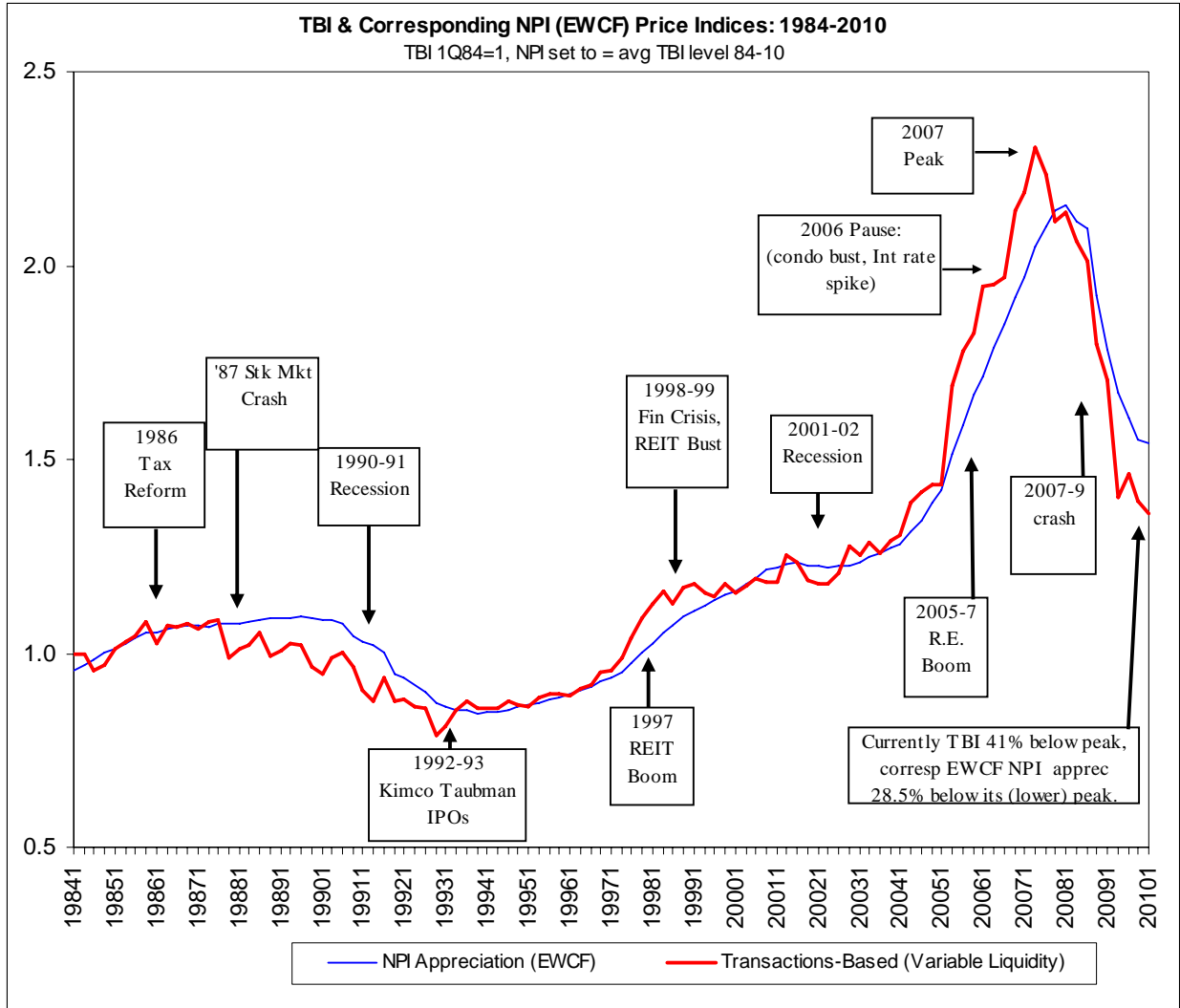
(Note that this liquidity metric is *not* sensitive to the official starting values of the three indexes in 1Q1984, which is admittedly arbitrary (at 100) but which cancels out in step two as the index returns each period are unaffected by merely multiplying the index *levels* by a constant.)



Finally, another metric that the TBI model allows us to report is an estimate of the current difference between the average transaction prices tracked by the TBI and the appraisal-based values reported into the NPI. Our estimate is that this gap grew slightly larger during the first quarter of 2010 to about 11% of the reported value for a representative property in the NPI. That is, the average price one could expect to sell a representative NPI property for during 1Q2010 was about 11% below its 1Q2010 reported value in the index, according to the hedonic valuation model that underlies the TBI.*

Above commentary reflects the opinion of the author only, not of MIT or the Center for Real Estate.

* We note that this does not imply that the transaction prices of the properties actually sold during the quarter were below their then-current appraised (or NCREIF-reported) values for those particular properties. The TBI can only estimate the difference between transaction price and NPI-reported valuation implicitly for the *average* (equal-weighted) property in the NCREIF population which consists largely of unsold properties. The properties actually sold during 1Q2010 averaged sale prices slightly less than 5 percent below their recent NPI reported values. However, properties are sold to some degree opportunistically, so it is to be expected that properties actually sold would evidence a higher average price relative to their current carry value than would be the case for the remaining unsold properties in the database.



Frequently Asked Questions about the TBI...

Excerpts from email discussions with index users...

Question (Meaning of Price vs Demand Indexes):

"My interpretation is that [the price index] metric represents the average value of all US core real estate [in the subject sector]. Data is also provided for the "Demand" and "Supply" indices. Is it an oversimplification to presume these indices suggest the trends in Seller's v. Buyer's asking price?"

Response (DG):

I would say that your interpretation is essentially correct. The (variable-liquidity) price index reflects the changes in prices in realized transactions, closed deals, and each of those deal prices of course reflects an agreement between parties on both sides of the market (supply as well as demand), and therefore the price index reflects the market "equilibrium" price (such as it was at the end of the time period reported by the index). Equilibrium prices are arguably the most important single measure because they do represent a sort of "agreement" between the two sides of the market and they represent actual money changing hands. However, in real estate transactions prices must be interpreted in the context of trading volume (or "liquidity") that is highly pro-cyclical in nature, with far less trading in a down market, especially in the early stages of a sharp downturn. Thus, you can't expect to be able to sell as many properties as quickly or easily at the equilibrium price in a down-market as at the equilibrium price in an up-market. (Maybe this matters to you, maybe it doesn't.)

So, to add depth and perspective to the picture, we produce the demand and supply side indexes. The demand-side ("constant-liquidity") index reflects systematic changes in what economists call the "reservation price" (or "private valuations") that potential buyers are willing to pay. This is not exactly the same thing as a "bid price", which in real estate may only represent an opening bid where deals are negotiated or put through multiple-round auctions. The same thing is true on the supply side, only from the perspective of the property owners, the potential sellers. Posted asking prices (if they even exist) are meant as a signal and perhaps a starting-point for negotiations. In contrast, the "reservation price" is the price at which the party will stop searching for an opposite party, stop negotiating, and do the deal. By looking at these two indexes reflecting reservation price movements on each side of the market you can get a deeper picture of what is going on underlying the transaction price changes in the market. Keep in mind that the indexes only reflect the relative changes across time *within* each index. You cannot relate the absolute level of any index with that of any other index as of any given time.

As noted, the TBI indexes are "statistical products", which means they can contain some estimation error, and also they are limited by some simplifying assumptions in their structure. For example, the underlying econometrics forces the model to assume the same magnitude of price-elasticity on the demand side and on the supply side. You will note that the difference between the variable-liquidity price index and the two reservation-price indexes (demand and supply) is always the same magnitude (just opposite sign) between those two sides of the market. This reflects the simplifying assumption of equal-elasticity magnitude (always equal across the two sides, but not constant over time).

Question (Sufficiency of Number of Observations):

“The MIT website indicated transaction volume was extremely low in Q408, which calls into question whether there was sufficient data available to support the current index value, particularly at the asset-class level.”

Response (DG):

Regarding your question about the number of transactions, in effect, the sufficiency of the sample size, we are getting scarily low. My sense (this is based on my experience and judgment, not formal statistical science) is that we are still OK at the aggregate level, for the all-property index. I have less confidence in the individual sectoral indexes. As I suggested on the web site, I would recommend consulting the Moody's/REAL Commercial Property Price Index for a transactions-price index that is based on a broader population and hence much larger sample of transactions, particularly for looking at the sectoral level. The Moody's/REAL CPPI is comparable to the variable-liquidity (equilibrium) price index version of the TBI, only the Moody's index tracks a much larger, broader population of commercial properties based on the Real Capital Analytics database. (You can download the Moody's data from either

<http://web.mit.edu/cre/research/credl/rca.html>

or

<http://www.realindices.com/real/index.htm>

as well as from Moody's).

Having said that, I must say that the three TBI sectoral indexes that we were able to produce this time (as noted, we couldn't do retail due to complete lack of sales), look fairly reasonable to me. This despite that they have only about a dozen transactions each. We don't have a policy of not publishing a TBI just because of few data observations, but one certainly does need to keep that in mind. In general I have been pleased with how reasonably the indexes seem to perform even with surprisingly few observations. We employ a noise filter that seems to be very effective. Nevertheless, as I said, I would take the sectoral indexes especially with a grain of salt.

Response Update (DG, 1Q09):

With even fewer observations in the indexes this quarter, I need to reiterate the above points. However, I should also say that I continue to be impressed (even more so) with the reasonable and relatively stable nature of the index returns in the face of less data than I expected we would ever have when we initially developed the TBI methodology. This has caused me to re-think how the indexes are working, and to see a strength in their structure that I did not originally consider. As noted in my commentary this period, I believe the TBIs' stability in the face of scarce data results from two main factors: (i) the quality of the main hedonic explanatory variable in our price model, the regularly-updated manager-reported valuations of the properties; and (ii) the pooled nature of the estimation database, which enables the thousands of transaction prices in the historic data to all be used in the model estimation process each period. This stability (smoothness in the indexes), as well as the prima facie reasonableness and believability of the index results, speaks to the accuracy of the indexes. Their ability to register turning points in the market prior to the appraisal-based NPI speaks to their ability to discover transaction-price-based information about market movements ahead of the NPI. Nevertheless, the TBI's price models' standard errors are quite large relative to the size of typical quarterly returns or quarterly volatility. There is certainly some noise in the indexes, though apparently much less than would be implied by a simplistic application of the time dummy-variable coefficient standard error magnitudes in the price regressions (which are in the range of 4% to 8% each period).

Question (Role of Appraisals in the TBI):

“While the information provided on the MIT website seems to suggest that the index is impacted only by actual transactions, your research paper on the topic also discusses the use of appraised values as reported by the NPI in the TBI. I would appreciate knowing exactly how the TBI incorporates appraised values, if at all.”

Response (DG):

Regarding your question about how the appraised values are used in the transaction price index, the appraised values are just a right-hand-side variable in the regression to control for qualitative differences cross-sectionally across the properties (such as size, quality of location, age, etc). The dependent variable in the regression is only the actual transaction price (per SF), hence, the index is truly a transaction price based index, not appraisal based. (Maybe I should clarify, the index measures "longitudinal" movements, changes through time, and it does so based purely on changes in transaction prices, not appraised values.)

Response Update (DG 1Q09):

As discussed in the 1Q09 update of my response to the previous question, I would now say that the above answer does not give full credit to the role of the “appraisals” in the TBI. (I put “appraisals” in quotes because, more accurately, the values we use as the main hedonic variable in the TBI models are the manager-reported “official” valuations of the properties that are reported into the NPI each quarter. These manager-reported valuations have traditionally been largely based on independent fee appraisals or in-house appraisals of the properties.) The NCREIF appraisals are updated regularly and frequently, even if not always every quarter for every property. The frequency, and “seriousness”, of the updating process seems to have gotten greater in recent years. And during the 2007-09 market collapse the updating process has become even more aggressive (especially starting in 4Q08). Thus, the main hedonic variable in the TBI price model is not just cross-sectional in nature, but has an important longitudinal component as well.

Response Update (DG 2Q09):

As noted in my commentary for 2Q09, the NPI “appraisals” (more correctly, the property owners’ reported values) serve a temporary role for the TBI sectoral indexes’ preliminary returns which are issued prior to the fourth calendar quarter each year. During calendar quarters one through three the noise filter used in the sectoral indexes “anchors” to the corresponding NPI capital returns (with the NPI defined on an equally-weighted cash flow basis comparable to the TBI). With the 4th quarter update each year these indexes prior quarterly returns during the latest calendar year are “re-anchored” to a calendar-year annual frequency transaction-based index (an annual frequency version of the TBI’s hedonic price model without any noise filter). It is these re-anchored and fully updated quarterly returns which then get “frozen” going forward after the end of the calendar year. Thus, the NPI appraisals can have some influence on the sectoral level TBI indexes during the three preliminary quarters of the current year prior to the 4th-quarter updating and “freezing” (but not on the all-property index). This can cause some lag bias in the preliminary sectoral indexes, the more so the more lagged the NPI is and the scarcer are the transaction observations.

Question (Backward Adjustments, 4Q08):

"We have noticed significant historical revisions in the price series. Were the revisions larger than normal, and is there a story behind them?"

Response (DG):

Regarding backward-adjustments, they may have been a bit larger than normal this time, probably due to the sharp turn in the market during calendar year 2008. As noted on the web site, we consider the "TBI" to be "preliminary" through the first three quarters of each year, then "finalized" (though there can still be further backward adjustments) with the 4th-quarter report. This is due to technical reasons which I will briefly explain here...

We use a ridge regression noise filter in the index. This is a Bayesian technique that works by biasing the return estimates towards an "anchor". The anchor is the transactions-based index estimated at the annual frequency at the end of every calendar year. By estimating at the annual frequency we have much more data in each period and hence less noise. (We also control for temporal aggregation at the annual frequency, so we avoid lag bias.) But we can only update that transactions price based anchor at the end of the calendar year. During the interim (other three quarterly indexes) we use the appraisal-based NCREIF Index as the anchor. The appraisal-based index is lagged, and that made an especially large difference during 2008 because of the sharp turn in the market. This is probably why the backward-adjustments were larger in 4Q08 than they usually are. The most recent index should be considered to be the most up-to-date and accurate for the historical returns.

Response Update (DG 1Q09):

This relates to the technical changes we are instituting in the TBI starting in 1Q09. From now on, there should be no backward adjustments to returns prior to the current calendar year, as we are "freezing" the indexes at the end of each calendar year as a matter of policy. This is being done to improve the practical usefulness of the indexes, and considering that backward adjustments have always been minimal and generally of no economic significance (particularly after the end of the calendar year). Also, we have adjusted the noise filter, eliminating it altogether in the aggregate all-property index. Analysis indicates that the noise filter is no longer necessary at the aggregate level, and eliminating it will increase the independence of the TBI from the NPI during the preliminary reports in the interim quarters.

Question (Index Base Period & Levels Comparisons):

"I was hoping you could tell me the base year for the transactions-based index. I think it might be 1983, but I was hoping you might be able to confirm for me."

Response (DG):

The base period is 1Q1984 (first return period 2Q1984) for the national aggregate index, and 1Q1994 for the sectoral indexes.

The base periods' index values for the TBI are not necessarily equal to 100. As you know, the base period value of an index (any index) is arbitrary. The meaningful information in the index is the periodic returns (relative changes starting from the base period). What our program does is to set the base period index value level to whatever level will give the TBI index levels an average value (across the entire history) equal to the average value level of the corresponding NCREIF Index in which the latter's base period value is set (arbitrarily) to 100. (We could have done it the other way round – it's just arbitrary we picked the NPI to set to 100.) This is done purely for

visual display in the graphs. In reality there is no rigorous comparison between the index value levels between the NPI and TBI indexes. You can't say that transaction prices were 5% above appraised values just because the TBI (capital index) happens to be, say 210 in a period when the NPI is 200. (However, if the next period the TBI moves to 189 and the NPI moves to 190 then you CAN say that period the transaction prices moved down 10% while the appraised values moved down 5%.) The reason we set the starting values as we do for visual purposes in the graphs is that, as an approximation, it does make sense to assume that appraised values and transaction prices will tend to have equal average values over the long run. While lagging and smoothing in the appraisal-based index will cause its returns to differ from the transaction-based returns over short-to-medium spans of time, over longer historical spans of time involving full "cycles" in the real estate market the differences between appraisals and transactions tend to cancel out: Appraisers tend to follow the market, just with some lag and perhaps smoothing off the peaks and valleys a bit.

Response Update (DG 1Q09):

We have now (as of 1Q2009) decided to indeed flip it around, and set the TBI indexes to all have starting values of 100 at their inception dates, and make the NPI's starting value (in our charts) float to the value that gives it the same overall average level as the corresponding TBI. It seems to make more sense, and to reduce confusion, to have the TBIs start at 100, since those are the indexes we are producing and publishing.

Response Update (DG 2Q09):

See the subsequent question and response below entitled: "How can demand index exceed supply index?"

Question (Aggregate index not composite, & missing retail 4Q08):

"I am trying to retrieve data on your Transactions-Based Index and it appears as though the fourth-quarter data for the retail segment is missing. It is present for the office, industrial, apartment and composite index, however. If the composite was calculated I would assume the retail data is available. If you can provide any feedback I would really appreciate it. Thank you very much."

Response (DG):

We could not publish a retail index for 4Q08 because there were no sales of retail properties out of the NCREIF database that quarter. The aggregate index is not a composite built up from the sectoral indexes, but rather is an independently-estimated regression based on the entire data sample of sold properties as if they were all members of a single population.

Response Update (DG 1Q09):

We have now updated and "backfilled" the retail index, by "straightlining" the index from 3Q08 through 1Q09 (in effect, assuming equal returns in 4Q08 and 1Q09). This is done on the basis of only a single retail sales observation in 1Q09. Nevertheless, the result seems broadly reasonable (retail down 7.3% over the two quarters, which we have apportioned as -3.7% in each quarter, geometric: $(1 - 0.073) = (1 - 0.037) * (1 - 0.037)$, with round-off). This is consistent with our previously-stated policy of reporting an index result whenever we can calculate one. (In the future, we may nuance this policy, reserving the right to not report a result if there is very scarce data *and* the result seems spurious or unreasonable. However, this is not the case in the present instance.)

Response Update (DG 2Q09):

The straightlined, backfilled retail index was frozen at the end of 4Q2008, but the index remained subject to updating and backward revision during the subsequent three quarters of CY 2009, with those revisions applying to all CY2009 quarters subsequent to the 4Q08 freezing. Thus, only the first of the two original equal backfilled quarters (4Q08 & 1Q09) remains at its original backfilled value of -3.7%.

Question (NPI capital index tracks below TBI long-term):

"I was trying to compare the MIT TBI Index with the NCREIF Capital appreciation index - I understand that there is a slight lag between the two indices - however, in terms of magnitude, I expected them to match up (for e.g., similar to your chart shown below, where you show inflation adjusted price series). I wanted to ask if you expect so much difference between capital appreciation being implied by the two series?"

Response (DG):

Keep in mind that the NPI official index differs from the TBI in two respects that affect direct comparisons of the capital returns.

First, the official NPI is value-weighted, larger property's returns count more heavily in computing the index return. The TBI is equal-weighted, all properties count the same. We use the equal-weighted version in the TBI because we view the TBI as essentially a statistical estimation, based on a sample of properties (the ones that sold) inferring from that sample the change in value in the market represented by the entire NCREIF population of properties. We view each sold property as an equally-valid representative of that population. Hence, it makes sense for us to use the equal-weighted version of the NPI for comparison purposes. Also, the equal-weighted NPI tends to have less volatility (in effect it is more diversified, less dominated by a few large properties). You can download the equal-weighted version of the NPI from the NCREIF website, via the custom query screen. However, the difference between equal-wtd vs value-wtd does not produce a systematic trend difference that would cause the index levels to diverge over time, which is what is bothering you, so this EW vs VW difference is not the answer to your question.

Second, the official NPI "capital return" (or "appreciation return") removes capital expenditures from the change in asset value that forms the numerator of the capital return computation. For example, suppose a property was worth \$100M at the beginning of the quarter and \$105M at the end of the quarter but had \$1M of capital expenditures spent on it during the quarter, then the NPI would compute the capital (or appreciation) return as 4%, not 5%. Suppose the property also generated \$7M of NOI during the quarter. The official NPI would record the "income return" as 7%, even though only \$6M of cash would have been available to the property investors after the CapEx. The NPI total return would be 4% appreciation + 7% income = 11%. This differs from the way stock market index returns are computed in terms of the breakout between capital and income. The income component is based only on paid-out dividends (not booked earnings), and the capital return is based on the stock price change no matter how much of that value change may reflect retained earnings plowed back into the company. If the properties described above were a stock the capital return would be 5% and the income return would be 6% (for the same total return of 11%). We do the TBI like a stock index. We don't remove CapEx from the TBI price index, as we mean that index to track commercial property price changes (for same properties), including the effect of (routine) capital expenditures on the properties. (The NPI and TBI do not include development or redevelopment or major rehab properties.) You can

download from the NCREIF website (via the custom query screen) a redefined version of the NPI capital and income return components defined as we do in the TBI, based on cash flows rather than book earnings. We use this redefined version of the NPI components in order to make the comparisons that we show on our charts. We call this the “EWCF” version of the NPI (equal-wtd, cash flow-based), and it is what we use in our charts. If you just compare the TBI price index with an NPI based on the official NCREIF capital (appreciation) returns, the NPI will trend below the TBI (even apart from smoothing or lagging effects) due to the removal of (on average about) 2%/year of capital expenditures from the official NPI capital index.

Question (How can demand index exceed supply index):

“The data is extremely interesting and useful, however, I don’t understand how Demand (or the bid) is ever greater than the Supply (or the ask). Meaning if the sellers were willing to sell the assets at a lower price than the buyers were willing to pay then the transaction would just execute and we would see the bid and ask be the same. Your data shows years when the Demand is greater than the Supply and I was hoping for an explanation as to what that means.”

Response (DG):

The indexes (all of them, not just demand and supply) actually only quantify percentage changes over time within the given index. That is, the price index only actually tells us how much realized (closed deals) transaction prices have changed; the demand index only tells us how much the potential buyers’ (average) reservation prices have changed; and the supply index only tells us how much the property owners’ reservation prices have changed, between any two points in time (since the indexes began). They do not rigorously tell us the relative price levels across the indexes as of any point in time. In principle in a rigorous sense you cannot compare index levels across indexes, only within an index across time. The starting value of each index is arbitrary (set at 100). This does not imply that all the indexes (price, demand, supply, total return) were actually at the same level at the inception date of the indexes (1Q1984 for the all-property indexes). Each index simply equals its starting value (call it “S(0)”, an arbitrary number) grown forward from the inception date at the actual accumulated (compounded) returns registered by the index each period:

$$S(t) = (1+r(t))*(1+r(t-1))*(1+r(t-2))*...*S(0), \tag{1}$$

where “r(t)” is the index return in period “t” (since the inception date). It is only the returns (the “r(t)” values for each “t” since inception) that are the actual “data” provided by the indexes, in a rigorous sense.

Having said that, one can nevertheless make some plausible and interesting comparisons (I think) across index levels, less formally, by making some reasonable assumptions (in effect, about relative differences in starting values). For example, in the charts that we produce for the TBI we put the TBI price index and the NCREIF Property Index side-by-side on the same chart for visual comparison purposes. To do this we re-set the starting value of the NPI (effectively multiplying each value level of that index by a constant) so as to equalize between the two indexes the average index value *levels* across the entire index history. This makes some sense as an approximation of the relation between the two indexes’ value levels, because on average over the long run the appraised values represented by the NPI are probably unbiased, that is, on average the appraisers are right over the long run (at least approximately, and as a practically useful assumption). Lagging and smoothing does not cause the long-run average NPI-reported valuation

to be biased; it just causes the current valuations to be biased on average (in one direction or the other at a given time depending on which way the market has been moving).

In a similar spirit, in our chart of the demand and supply indexes we (arbitrarily) re-set the starting value of the supply index to give it the same long-run average value level as that of the demand index. Again, this does not affect the periodic returns, the actual data rigorously in the indexes, as the index level is adjusted only by multiplying each level by a constant which cancels out in the return: $r(t) = S(t)/S(t-1) - 1$. (See what happens in this ratio to $S(0)$ when you plug formula (1), above, into this return formula.) In effect, this index level adjustment calibrates the demand and supply indexes so that they will be equal (or approximately equal) in levels during times when the institutional property market is at a “normal” or “average” level of liquidity (trading volume is at a typical level, not exceptionally “hot” nor exceptionally “cold”). Formally speaking, this is an *ad hoc* calibration. But hopefully you can see the logic and intuition in it. (However, please note the second paragraph in the footnote on page 3 of my “commentary” to our 2Q09 release of the TBI, downloadable from the Center’s website this quarter.)

So to come around finally to your original question: how can the demand index ever be above the supply index?... Based on the calibration I just described, this would happen when the demand is relatively strong, that is, when potential buyers’ are moving their reservation prices relatively higher compared to their long-run average, and relative to the reservation prices of the property owners. As you can see from the chart of the “Liquidity” measure on page 2 of the 2Q09 commentary (the sign of that measure is based on the difference between the demand index level minus the supply index level), the demand index exceeds the supply index calibrated in this way during the major “boom” periods of price appreciation during the late 1990s and the 2003-07 period. (Of course, one can get a different visual perspective by recalibrating the indexes, for example, the chart at the end of the press release sets all indexes to have equal values of 100 at the end of the year 2000, to emphasize changes only since then.)

Naturally, there are many (and heterogeneous) potential buyers, and similarly many heterogeneous potential sellers. Whenever a transaction is consummated it means that one of those buyers had a reservation price that was at least as high as the reservation price of one of those sellers. (The transaction price occurs somewhere between the buyer’s and seller’s reservation prices, the outcome of their negotiation process.) Greater transaction volume (greater turnover in the market) indicates that there are proportionately more such overlaps in the population (relatively more buyers whose RPs exceed those of sellers). Think of there being a frequency distribution of all of the potential buyers as a function of their RPs; and another frequency distribution of all of the potential sellers as a function of their RPs. These two frequency distributions overlap on some range of prices, and that price range is where the trading happens. The TBI demand and supply indexes measure the movements (across time) in the average values of each of those frequency distributions of RPs (assuming each side of the market has the same range or variance in their distribution).

If you want a more in-depth explanation of how the demand and supply indexes work (including a graphic that illustrates the overlapping buyer & seller distributions I was referring to in the previous paragraph), you can download the technical documentation of the TBI from the “Fisher, Geltner & Pollakowski” link on the Center’s TBI web-page (it’s in the section titled: “TBI

Details & Usage”). The graphic is in Exhibit 1 on page 39 of that paper, and it is discussed on pp. 7-12 of the manuscript.

Question (Out-of-bounds anomaly between all-property & sector returns):

“Can you tell me how it is that the price index for all property types went up 4.4% but all the individual property type price indexes went down? This seems counterintuitive to me.”

Response (DG):

This type of thing can happen in principle purely due to noise in the indices, differential noise across the five indices. However, this would be a rare and minor occurrence and not a systematic effect. The major systematic manifestation of this phenomenon has occurred during the 2009 downturn, prior to the 4th calendar quarters, as a result of a combination of scarce data in the sectoral indices and substantial lag in the appraisal-based NCREIF Property Index (NPI). The “out-of-bounds phenomenon” with all four of the sector indices’ returns being more like those of the official NPI sectors than like the TBI all-property can result from the different index construction methodology between the aggregate and sectoral indices. Due to the smaller transaction sample sizes in the sectoral indices those indices employ a noise filter which during the three quarters prior to the last quarter of the calendar year results in an anchoring of these indices to the appraisal-based NPI, causing a lag bias in the sectoral TBI indices compared to the all-property index, prior to the fourth calendar quarter. With the 4th-quarter index updates, this bias will be corrected (and then the corrected returns frozen into the indices going forward), as the 4th-quarter anchor for the noise filter is an annual version of the TBI transaction-based index.

In the meantime, the all-property TBI should be used as the better gauge of the magnitude of the overall or average price change. (The all-property index of course has more data to work with, and it no longer employs the noise filter that pushes returns toward the NPI prior to the 4th quarter of the current year.) Also, due to the very small sample sizes in the TBI sectoral indexes (particularly during market downturns when the number of transactions declines), readers may want to consider looking at the Moody’s/REAL CPPI sectoral indexes for a better indication of sectoral price movements. (Like the TBI, the CPPI is a same-property transaction price based index whose methodology was developed at the MIT/CRE; it is published by Moody’s Investors Service under license from Real Estate Analytics LLC, based on transaction data from Real Capital Analytics Inc. The CPPI is also available after a lag on the MIT/CRE web site.)