Response to a Report on the appropriate weighted average cost of capital for the ULLS network by Professor Bowman dated December 2005

by

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1.   The purpose of this statement is to respond to aspects of the report prepared for Telstra by Professor Bowman. In particular this statement questions the estimate of the market risk premium used by Telstra and its assertion that asymmetric risks warrant the use of a weighted average cost of capital **(WACC)** above the best available estimate of the true WACC.

2.   This statement concludes that the WACC proposed by Professor Bowman is likely to overstate the WACC of an efficient forward-looking operator of the public switched telephony network **(PSTN)**.

Market risk premium

3.   Professor Bowman has applied two approaches to estimate the market risk premium **(MRP)**. They are an historic average approach and a benchmark approach based on a forward-looking MRP in the US adjusted for country specific differences with Australia.

4.   Professor Bowman concludes that both approaches lead to an opinion that a "long-horizon" estimate of 7% is appropriate and is more supportable than the Australian Competition and Consumer Commission **(ACCC)** estimate of 6%.

5.   The MRP should reflect the premium demanded by investors for investing in equity rather than debt. It is inherently a forward-looking concept.

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[1] I am employed by Optus as its head of regulatory economics. I hold a Master of Economics from the University of Sydney.

Historic approach

6.   The rationale for using an historic approach to estimate a forward-looking MRP is
        that investor expectations might be framed on the basis of past experience or,
        more specifically, investors' expectations of future risk are based on past risk. A
        key dilemma with this approach is the question of which historic period is relevant
        for current investors to form expectations as to the future MRP.

7.   The MRP is not constant. Estimates based on an historic average need not be an
        inaccurate reflection of investor's expectations.   Investors risk aversion and the
        risk of the average investment in the market changes over time. Using long term
        historic figures to construct an average may therefore construct an average across
        different distributions. The degree of error in such calculations will depend on the
        length and form of the distributions.

8.   Nevertheless simple averages of long term historic returns are commonly used in
        the finance literature and are reported by Professor Bowman, at least as
        calculated by other authors. The range of estimates reported by Professor
        Bowman is from 6.2% to 7.7%, with a mid-point of 7.0%.

9.   In my view there are a number of reasons why the use of historic averages are not
        appropriate and cannot be relied on as is done in Professor Bowman's conclusion.
        Firstly, despite the long time periods used, there remains substantial variation and
        hence uncertainty as to the historic average MRP. For example, the standard
        error associated with the average MRP (of 7.6%) for the period 1900-2002 is
        around 1.9%.[2] This means that, even if historical data gives an unbiased estimate
        of the true MRP, a range of 3.8% to 11.4% is needed to have a 95% chance of
        capturing the true average historic MRP.

10.   Second, long term historic data may not be a guide to future expected MRP. To
        the extent that historic data frames investors' expectations, recent highs in world
        equity markets might elicit reasonable expectations from investors that future MRP

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[2] Dimson, March and Staunton (2003), "Global evidence on the equity risk premium", version of paper was
as forthcoming in *The Journal of Applied Corporate Finance*, Vol. 15, No. 4, Summer, 2003. The estimate of
7.6% is the arithmetic mean of historic MRP relative to bonds.

may be somewhat less than recent returns or perhaps negative. Alternatively, the change in the MRP may be temporary. Campbell (2001)[3] concludes that:

> *It is too soon to tell which of these views is correct, and I believe it is sensible to puts some weight on each of them. That is, I expect valuation ratios to return part way but not fully to traditional levels.*

11.   Campbell (2001) concludes on this basis that a forward-looking MRP in the US is about 3-4%. A figure substantially below that of Professor Bowman in his benchmarking approach.

12.   Third, the use of an historic approach fails to take into account permanent changes in domestic and international markets. Notably at paragraph 55 to 57, Professor Bowman rejects the view of the ACCC that the MRP has fallen due to changes in Australian markets. In contrast, in Appendix B, the benchmark approach adopted by Professor Bowman appears to accept the argument and the work of authors that a forward-looking MRP for the US is 5.5%, below the reported historic average MRP of 7.6%. Professor Bowman identifies four changes that may yield a forward-looking MRP below historic rates. These include:

(a)   Greater opportunities for portfolio diversification.

(b)   Seemingly permanent inflation rate control leading to interest rate stability and reductions in business risk.

(c)   Reduction in investment risk through more advanced financial securities.

(d)   Reduction in transaction and monitoring costs.

13.   To these could be added other effects that have served to reduce business risks, such as improvements in management and technological advances leading to greater efficiency.

14.   It is worth noting that the accepted wisdom that Australian capital markets have historically been more fettered than US capital markets may reasonably allow a

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[3] Campbell (2001), "Forecasting US equity returns in the 21st century", Harvard University, Testimony to the Social Security Advisory Board.

conclusion that such factors are even more relevant in examining historic data from Australian markets and hence support the ACCC choice of a lower bound estimate of the historic MRP. Nevertheless, making adjustments to historic data is problematic and necessarily consistent with a high risk of error.[4]

15.   On this basis, unmodified historical data from Australia cannot readily be relied upon for a point estimate of the MRP for a local PSTN operator.

Benchmark approach

16.   The benchmark approach used by Professor Bowman involves using the United States **(US)** as the benchmark for an open economy and adjusting a forward-looking estimate of its MRP to reflect country specific risks.

17.   In arriving at a forward-looking estimate of the MRP in the US, Professor Bowman considers a number of sources including historic data, historic data adjusted for capital market developments, survey evidence and other expert opinion. Professor Bowman estimates a US MRP of 5.5%.

18.   Notably, Professor Bowman does not consider forward-looking estimates based on analysts' earnings forecasts. These can be broadly classified into estimates based on the dividend growth model and the residual income model. The latest developments have surrounded the residual income model. These models appear to produce estimates of the forward-looking MRP of between 3% and 6%, with some consensus around 4%.[5] On this basis, the estimate of a forward-looking MRP in the US would be consistent with that estimated by Professor Bowman, notwithstanding his estimate appears to be at the upper end of the range.

19.   As to the adjustments for country risk differences proposed by Professor Bowman, these do not appear necessary. As markets around the world have become more integrated, country specific risks tend to be dominated by global trends and the MRP in markets such as Australia are likely to have been substantially lowered.

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[4] See Gray and Officer (2005) *A review of the market risk premium and commentary on two recent papers,* A report prepared for the Energy Networks Association, August 2005.
[5] Claus and Thomas (2001), "Equity premia as low as three percent? Emprical evidence from analysts' earnings forecasts for domestic and international stock markets", *Journal of Finance* 56(5); and Gebhardt, Lee and Swaminathan (2001), "Towards an implied cost of capital".

20.   Dimson, March and Staunton (2003) support adjustment to historic averages of the MRP for long-term changes in capital markets, however in relation to country specific risk they concluded that:

> *… while there are certainly differences in risk between markets, they are unlikely to account for cross-sectional differences in historical premiums. Indeed, much of the cross-country variation in historical equity premiums is attributable to country-specific historical events that are unlikely to recur. When making future projections, there is a strong case, particularly given the increasingly integrated nature of international capital markets, for taking a global rather than a country-by-country approach to determining the prospective equity risk premium.*

21.   Dimson, March and Staunton (2003) support a global forward-looking MRP of around 5%. The need for country specific adjustments may be needed if investors cannot diversify internationally. I note that Professor Bowman has acknowledged the significance of reductions in transaction and monitoring costs which might be an impediment to global diversification. I also note that Professor Bowman does not make adjustments for taxation rates.   As such, country specific adjustments are unnecessary.

22.   In relation to international precedent for setting the MRP it is difficult not to be persuaded by Ofcom's (the UK regulator) Final Statement on Ofcom's approach to risk in the assessment of the cost of capital of 18 August 2005, when it said:

> *Between 2001 and today Ofcom has not made a significant change to relative amount of weight that it places on different estimation methods, although putting weight on the DMS[6] adjusted historic data has inevitably meant putting somewhat less weight on other data sources such as unadjusted historic averages and regulatory benchmarks. Rather, the key change to Ofcom's ERP[7] estimate has been the emergence of the DMS work, which Ofcom considers to be the single most authoritative source of estimated premia based on historic data. As explained above, this work*

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[6] Dimson, March and Staunton (2003)
[7] Equity risk premium

points towards premia that are lower than most of the previously quoted
estimates. As explained above, in 2001, Oftel put a significant amount of
weight on historical estimates that were in the region of 7%. Ofcom's current
view is that, given the availability of the DMS data source, putting any
significant amount of weight on such high estimates would not be
appropriate, even given a bias in favour of encouraging discretionary
investment ahead of short-term consumer preference.

23.   On this basis, the MRP for a local PSTN operator will be at most 6%.

Reasonableness test

24.   Professor Bowman presents a reasonableness test of the ACCC position that the
        MRP is 6%.

25.   In my view the reasonableness test proposed by Professor Bowman does not
        demonstrate a valid criticism of the view that forward-looking rates are lower than
        historic figures. As such, the reasonableness test should be rejected.

26.   The use of shorter periods for the calculation of historic averages (for the purposes
        of estimating forward-looking estimates that account for changes in the market risk
        premium) are commonly not adopted because of the volatility in the premium
        estimated over those shorter periods.

27.   Hence, the choice of a 10 year moving average quantifies the variance in such a
        way as to guide the reader to a conclusion that the concept proposed by the
        ACCC is not reasonable.

28.   Gray and Officer (2005) report the MRP for different lengths of periods up to 2004.
        They show that the choice of period has an impact on the historic MRP as follows.

Length of period (years)	Period	MRP
30	1975-2004	7.70%
50	1955-2004	6.43%
75	1930-2004	6.58%
100	1905-2004	7.15%
120	1885-2004	7.17%

29.   Changes in capital markets will be reflected in the MRP over the period in which they occur, but yet may not be observable from short-term (rolling) average data because of the volatility of returns. The observations of Professor Bowman based on increasing return volatility do not therefore allow for a conclusion on the impact of changes in capital markets over the last 50 years.

Asymmetric risk in the WACC

30.   Professor Bowman presents a series of recommendation to allow for an upward bias in the regulated WACC for Telstra's ULLS network. Professor Bowman goes further at paragraph 210 to say that:

> *In my opinion, **all regulatory** WACCs should be determined with reference to the error involved in estimating the parameters and hence the WACC. Further, the regulatory WACCs should be set above the best estimates of WACC to reflect the asymmetry of the social consequences of errors in setting WACC. This should be **done as a matter of principle**. (Emphasis added)*

31.   In my opinion, there can be no general presumption that setting an unbiased regulatory WACC will lead to negative social consequences. I believe that consideration of the specific circumstances of Telstra's ULLS network suggests that there is no asymmetric risk of regulatory error.

32.   Asymmetry in social consequences around the "true" (or efficient) value should only be reflected in an upward bias in the regulated WACC if:

i.   The relevant potential error in the regulated WACC has an impact on the level of investment; and

ii.   The loss of surplus from too little investment is greater then the lost surplus from too much investment.

33.   Both of these conditions must hold.

Impact of "error" in WACC on level of investment

34.   When a firm is free to choose its investment timing, setting a regulated return too
        low may delay investment which is of benefit to consumers. Firms will invest when
        they can recover their cost of capital and when there is no incentive to delay the
        investment. If a firm is not free to choose its investment timing, due to, say, a
        universal service obligation, such effects on investment are unaffected by
        regulatory decisions. The same is obviously true if the investment has already
        been made and is irreversible.

35.   A large proportion of the capital invested in the ULLS network is sunk. This means
        that the investment decision in relation to these assets is irreversible (by definition)
        and therefore the effect of an additional return on capital in the regulated WACC
        will not effect the decision of whether or not to invest.[8] Thus, the only relevant risk
        to investment is that which relates to maintaining and incrementally expanding the
        existing network.

36.   One must then ask the question "Would Telstra fail to maintain its PSTN asset
        base due to a small error in the WACC? In my opinion the answer to this question
        is clearly "no". Failing to maintain the PSTN puts at risk $7.7 billion of Telstra
        revenue per annum that can only be earned by ensuring a functioning PSTN[9]. By
        contrast, even a 10% error in the WACC only costs Telstra $88.7 million per
        annum (being 10% of annual new investment in the PSTN)[10].

37.   In effect, Telstra's cost of not investing to maintain the PSTN is materially positive.
        Professor Bowman implicitly assumes that Telstra's costs of not investing are zero
        and that, therefore, an error in the WACC will lead to a failure to invest.[11]   In
        reality, the costs of not investing almost certainly exceed the costs of investing -
        even if the WACC received on that future investment has an error.

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[8] This is not to say that regulators should intentionally set a low return on capital (WACC) to expropriate
returns on "sunk" assets (notwithstanding that it would not impact on efficient on-going investment in those
assets). Such regulatory action would send an inappropriate signal to investors considering future
investments in potentially regulated industries.
[9] Telstra Annual Report, 2005, p. 76, revenue from PSTN products.
[10] Telstra Annual Report, 2005, p. 118, being 10% of the net cash invested in customer access.
[11] Professor Bowman says that the WACC set "even a little too low" can "threaten the viability of the
provision of services". Such a conclusion for the ULLS network is unfounded. Perhaps in investments which
are not yet sunk, such factors may need to be considered.

38.   Once the costs to Telstra of not investing are recognised, the case for asymmetric costs of regulatory error reverses. That is, setting the WACC too high will likely impose greater social costs, in the form of higher consumer prices and over-investment, than setting the WACC too low.

39.   There are a number of other reasons to believe that Telstra's return on its investment, after taking into account the costs of not investing, will significantly exceed the regulated WACC. If this is the case, the incentive to invest will be unaffected by the potential error in the parameters in the regulated WACC. It is for these reasons that the absence of an upward bias will not harm efficient investment in existing and new ULLS network infrastructure by Telstra. Some of the reasons are as follows:

   i.   The WACC allowed for in the model is on a hypothetical network investment allowed by the continual re-estimation of forward-looking TSLRIC models such as the PIE II model. Thus, what the WACC is applied to is, in effect, independent of what Telstra actually spends.

   ii.   The actual future network expenditure is a fraction of that proposed by the forward-looking model, as a significant proportion of Telstra's ULL network investment is sunk.

   iii.   Telstra utilises its ULLS network for the provision of services not captured in its PIE II modelling. These include broadband services supplied over xDSL technologies.

   iv.   Telstra earns rents in downstream markets that are dependent on its on-going investment in its ULLS network.

   v.   Telstra may in the future vary its capital structure.

Asymmetry in lost surplus from over or under estimating WACC

40.   Professor Bowman asserts that it is "widely agreed that in regulatory environment, the long-term social costs of under estimating the cost of capital are higher than are the long-term social costs of over estimation." I accept that regulators have

agreed that the cost of failing to have regulated services exceeds the cost of having those services at a price which is above the true cost of provision. In the *specific circumstances* where setting the WACC too low will lead to the cessation, or failure to develop, services then Professor Bowman is correct. However, the burden is to show those specific circumstances exist in relation to the PSTN and ULL services. Professor Bowman presumes they do rather than actually showing they do.

41. The existence of a long-term social costs requires that the loss of surplus from too little investment is greater then the lost surplus from too much investment. The existence of such asymmetry relies on the existence of two possible biases:

    i.   The amount of incremental capital withheld by investors when the WACC is set too low is greater than the amount of incremental capital they employ when the WACC is set too high; or

    ii. Consumers' valuation of the capital withheld when the WACC is below the best estimate exceeds consumers' valuation of the capital over-employed when the WACC is set above the best estimate. In other words, the rate at which the value of capital expenditure is diminishing is itself diminishing.

42. As outlined above, there are strong reasons to believe that Telstra would not cease to invest in the ULLS network if the higher WACC proposed by Professor Bowman were not allowed. Indeed, evidence suggests that Telstra has continued to invest in its ULLS network based on historically lower access prices for its ULLS.

43. Also, investors face similar uncertainties as faced by the ACCC as to the true WACC. In addition, investors have different levels of risk aversion. These factors combined means that there is no single magical value of the WACC that investors demand. Setting the WACC one standard deviation below the average estimate may draw less capital than setting the WACCC at the best estimate; however, it will not mean it dries up. Similarly, and perhaps symmetrically, setting the WACC one standard deviation above the best estimate will draw more capital.

44.   I can see no evidence that the capital offered by investors in the ULLS network would be asymmetric around the point estimate of the WACC proposed by Telstra (or for that matter the ACCC).

45.   As to consumer's valuation of capital expenditures, at paragraph 149, Professor Bowman asserts that:

> *If the WACC is set too high, there will be a cost imposed on the ultimate consumers, but this is unlikely to have a detectable effect on individual consumers.*

46.   This is plainly incorrect. The setting of prices above marginal cost has significant consequences for consumer surplus. Prices for telecommunications services such as those supplied by ULLS network are likely to be already set well above marginal cost, creating significant deadweight loss (lost surplus). Additional allowances in the cost of capital on sunk (fixed) assets will increase the distortion and further lower surplus.

47.   Perhaps more correctly, Professor Bowman suggest that quality of service may be effected when he notes the potential for "disincentives for the provider of the service to invest or to properly continue maintenance or service quality" and for "the provider of the services will [not] have sufficient incentives to engage in maintenance of the service and its quality and to invest innovation and improvements in the service assets".

48.   However, again there is no evidence that consumers' valuation of these different levels of quality is asymmetric. That is, do consumers value lower than efficient quality (from less than efficient investment) more than they value the lost surplus from higher than efficient quality (from too much investment)? To my knowledge, no evidence has been provided by Telstra or Professor Bowman to this effect.[12]

Statistical assessment – "one standard deviation rule"

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[12] Similarly, a higher WACC may encourage wasteful innovation that lowers overall surplus and a lower WACC may encourage too little innovation. It is not clear whether consumers value these alternatives asymmetrically.

49.   Uncertainties regarding parameters in the WACC are not restricted to the statistical uncertainties identified by Professor Bauman. They extend to choices of data sources and methodological approaches to parameters.

50.   Therefore, the choice of one standard deviation as a "rule" for the setting of the WACC is not always possible and the regulator may need to give subjective weight to different estimates. I would therefore reject application of the proposed rule.

Summary

51.   There can be no presumption that the effect on total surplus from errors in estimating WACC parameters is necessarily asymmetric in the case of the PSTN and ULLS. If anything, the costs of setting the WACC too high may exceed the costs of setting it too low.

52.   The fact that a significant proportion of the asset base invested in the ULLS network is sunk means that the likely impact on efficient investment in this network is likely to be limited, yet the impact on consumer surplus through higher prices may be significant.

53.   In any event, the regulatory model applies the WACC to a hypothetical capital base rather than one reflecting Telstra's actual expenditure. It is difficult to conceive of how a higher WACC on a *hypothetical* asset base will encourage investment by Telstra in its *actual* asset base.

54.   In addition, there is no evidence that capital expenditures associated with the varying the WACC is asymmetric and nor is there evidence that consumers valuation of different levels of capital expenditure is necessarily asymmetric.

55.   As such, setting the WACC to account for such potential asymmetries is likely to lower total surplus and will not promote efficient investment in ULLS network infrastructure.