Response to Comments of Referee #3
"Behavioral Measures and their Correlation with IPM Iteration Counts on Semi-Definite Programming Problems" by R.M. Freund, F. Ordóñez, and K-C Toh

Responses to main concerns:

1. We are inclined to keep the sections on non-strict complementarity and degeneracy, in spite of the negative results. To the best of our knowledge this work is the first attempt to compute the degeneracy of SDP problems, and is the first work to propose a measure of near-non-strict complementarity and to compute it for SDP problem instances. Thus it may have some important reference value for researchers doing computation on SDP problems. Furthermore, prompted by another referee's concerns, we have attempted to measure the extent to which strict complementarity is correlated with local convergence rates, and have shown some modest correlation, see the discussion on pp. 19-20 and page 23.

2. Regarding alternative expressions involving $\log(C(d))$ and their correlation with IPM iterations, we tested a number of simple expressions involving $C(d)$ which are suggested by theory. Here are our results:

Expression	CORR($\cdot$, IPM Iterations)
$\log(C(d))$	0.6301
$\sqrt{m}\log(C(d))$	0.3878
$\sqrt{m+n}\log(C(d))$	0.3538
$(m+n)\log(C(d))$	0.1769
$\sqrt{n}\log(C(d))$	0.1669
$n\log(C(d))$	0.0125

We mention these results briefly on page 16 of the revision.

Responses to specific comments:

1. We amended abstract and introduction to explain that CORR is the sample correlation.

2. The wording in the first paragraph of the introduction now makes it clear that the correlations were done by the authors, not in the referenced work [17].

3. We believe that the referee's comment about shortening the proof of Proposition 2 misses a point. We are showing that if $B(x, r) \subset K$ then $x^s - rI \in S^s_+$, not for some appropriate r, but for the same one that defines the ball. We are not sure we can shorten the proof following the referee's suggestion.

4. We prefer to leave the notation g^m rather than g^m_ε for two reasons: the suggested notation is cumbersome, and the effect of different ε on g^m is very minor. This is discussed further below in the next point.

5. None of the three co-authors was able to understand completely the referee's comment about how we select ε.... We believe that the referee means we can take $\varepsilon = \frac{1}{2}\bar{\varepsilon}$. It is true that our definition of ε is influenced by the algorithm as it might obtain a different terminating duality gap. However the effect of different ε on D^ε is quite minor. We did some experiments changing ε and the terminating gap is only active when there is a lot of precision in the solution, otherwise it defaults to $\varepsilon = 10^{-3}/2$.

6. we amended the text to say " 32 of the 85 SDPLIB problem instances have no primal interior solution within software tolerance" on page 9.

7. we amended the text as you indicated concerning the definition of the realtive error "err" on page 10.

8. we changed (CP) to (SDP) on the top of page 18.

9. we amended the text on page 18 regarding the slope of the function $2\sqrt{\mu}$