Dissertation Mark Sheet

University of St Andrews—School of Economics & Finance

Student ID: 170015890

Note: Each marker should complete Part A of the mark sheet, providing their individual assessment of the dissertation. After the two markers have agreed on a mark, the first marker should fill in Part B of the mark sheet.

Part A: Individual Assessment

Name of Marker: Katerina Petrova

Role of Marker: ☐ First Marker ■ Second Marker

Suggested Mark: 19.5

Please tick the box of the appropriate mark band. The overall mark is not necessarily an unweighted average of the individual marks.

	16.5-20.0	13.5-16.4	10.5-13.4	7.0-10.4	4.0-6.9	0.0-3.9	N/A
Understanding & knowledge	✔	☐	☐	☐	☐	☐	☐
Critical analysis & evaluation	✔	☐	☐	☐	☐	☐	☐
Originality & independent thought	✔	☐	☐	☐	☐	☐	☐
Appropriate methods	✔	☐	☐	☐	☐	☐	☐
Clarity of argument	✔	☐	☐	☐	☐	☐	☐
Dissertation structure	✔	☐	☐	☐	☐	☐	☐
Style, language, and use of illustrative material	✔	☐	☐	☐	☐	☐	☐
Bibliography and referencing	✔	☐	☐	☐	☐	☐	☐

Detailed Comments

This is an example of an MSc dissertation which reads more like a chapter of a PhD. It is clear that a very large amount of work and effort has gone into writing it, not only in terms of learning new mathematics, but also in terms of reading literature from other disiplines, and attempting to write an interdiciplinary essay. Finally, I think the work is highly original. Moreover, the student has attempted to write a theoretical essay which is beyond the expectations from an MSc dissertation. And simulation studies are performed using Matlab. Overall, it is impressive that a piece of work like this can be produced within the short time available for an MSc dissertation. I do have several comments, but the student should read these as a 'referee report' or guidlines for further improving this work in the event that the student decides to pursue a PhD on the topic. Chapter 2 is a little long, and because there are too many ideas at the same time, could be confusing for a reader. Moreover, for a scientific paper, chapter two needs to be a lot more focused and it needs to motivate the remainder. I have many comments on Chapter 3, some more important than others. First, the student claims that OLS is BLUE for the model in 3.1. This is generally NOT true for a time series model; because a necessary condition for Gauss Markov is that the OLS is unbiased, and this is not true unless a strong assumption is imposed on independence of the error term and covariance stationary X. Moreover, for an AR(1) model in 3.4, the OLS is NOT unbiased and there is a vast literature on bias corrections. However, the argument in chapter 3 will go through if the word 'asymptically' is added in front of BLUE. The model in 3.4 can be re-written as an ARMA model. It is obvious, that OLS of y (t-1) on y(t) would not have desirable properties when the MA part is ignored. In fact, OLS should also be inconsistent in this case. My hunch is that the vox predictor based on the conditional normality will reduce to linear GMM or really instrumental variable estimator, where the instruments are lagged values of the dependent variable y(t-2). If I am right, then this estimator shares similarity with various papers in the literature that show that MA(q) components can be ignored as long as an MM estimator is used with instruments y(t-q-1). It can be shown that such an estimator is consistent and so will perform better than OLS, if there is an MA component which is ignored. An alternative way to look at the model in 3.4 is as an AR(1) with serially correlated error, a problem which has also received a lot of attention in the literature; where an external instrument can be used to solve the endogeity caused by the serial correlation. The student should think of linking the proposed estimator to existing literature in order to better understand its strenghts/weaknesses and well as its asymptotic behaviour! Many of the theoretical results exist, so no need to re-prove them. The simulation exercise is good, but can be improved further. The reason why the estimators work in the nonstable framework is that the student is only interested in point estimates, and recall that in the standard case we have superconistency with unit root; however, what is nonstandard is the asymptotic distribution so that CI would be invalid.

Part B: Agreed Mark

Only the first marker has to complete Part B of the mark sheet.

Agreed Final Mark: ☐

Suggested Marks:

Marker 1: _____

Marker 2: _____

Justification

Please give a brief justification for the final mark. This part must only be completed if the agreed mark is not the average of the two marks and the examiners' marks are three or more points apart.

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Part A: Individual Assessment

Name of Marker: Rod McCrorie

Role of Marker: ■ First Marker ☐ Second Marker

Suggested Mark: 17.0

Please tick the box of the appropriate mark band. The overall mark is not necessarily an unweighted average of the individual marks.

	16.5-20.0	13.5-16.4	10.5-13.4	7.0-10.4	4.0-6.9	0.0-3.9	N/A
Understanding & knowledge	✔	☐	☐	☐	☐	☐	☐
Critical analysis & evaluation	✔	☐	☐	☐	☐	☐	☐
Originality & independent thought	✔	☐	☐	☐	☐	☐	☐
Appropriate methods	☐	✔	☐	☐	☐	☐	☐
Clarity of argument	✔	☐	☐	☐	☐	☐	☐
Dissertation structure	✔	☐	☐	☐	☐	☐	☐
Style, language, and use of illustrative material	✔	☐	☐	☐	☐	☐	☐
Bibliography and referencing	✔	☐	☐	☐	☐	☐	☐

Detailed Comments

The work undertaken in this dissertation was exceptionally ambitious for the M.Sc. level and could be thought of, more appropriately, as the chapter of a Ph.D. The work contains some genuinely original thought and research and has an interdisciplinary element that is unusual by the current standards of research in Economics would be unusual (but the question addressed is entirely appropriate). The essential idea is to apply a statistical estimator that is used in Psychology - the wisdom of crowds - and to examine its efficacy as a basis of estimation and prediction in Econometrics. The student has worked hard to set this estimator properly within an econometric context and, although he might not have achieved this entirely, he has offered an understanding of underlying econometrics that could be viewed as exceptional for the M.Sc. level. He has also learnt and implemented MATLAB for the purpose of evaluating his estimator. I will first offer an appraisal of his work at face value and then evaluate it against the standards of an MSc dissertation.

The first interesting facet is in the relation of the wisdom of crowds to limit theory in econometrics and his essential argument is that if individuals can be aggregated to crowds under the conditions under which laws of large numbers and central limit theorems hold, then the crowd will behave (or "benefit") from regularity and convergence towards true, unknown parameters that is embodied in the statistical theory. Therefore, if the wisdom of crowds is going to have efficacy over other, more conventional estimators, it will have to be under conditions where the statistical theory may not hold. To compare his estimator against OLS in a classical regression model in circumstances where the assumptions could fails is therefore - in purely research terms - therefore a modest exercise. But it's a certain first start, and is exceptionally ambitious in the context of an MSc dissertation given the time available. There are other concerns: one is that linear estimators in linear models are typically biased; the assumption of normality is strong; and there isn't an entirely appropriate treatment of non-stationarity both in the model set-up and the simulations. In non-stationary models, the bias will persist even asymptotically and there are questions as to the applicability of the limiting arguments that aren't addressed. The material in Section 3 digs deeper into the way in which regression essentially factorizes a jointly normal distribution into conditional normal and standard normal distributions and, while he has offered his own approach, the key trick to consider the square of the integral is known. (To extend this approach in the current context to non-normal distributions would be a research question that would require some engagement with Laha-Lukacs theory.) It would have been nice to have seen more discussion and results that pertained to the parameter space of the beta parameter in (3.4) and the implications for e.g. (3.19) but this type of detail is very difficult to address properly under the standard rules of MSc supervision. But one point that could be made is that, ideally, there would have been a more extensive experimental design that saw the beta parameter take on a wider range of values. All in all, however, it is a remarkable piece of work for an MSc dissertation that involved engagement with literature in different fields, mathematical and statistical argument, simulation and computer programming.

Part B: Agreed Mark

Only the first marker has to complete Part B of the mark sheet.

Agreed Final Mark: 18.0

Suggested Marks:

Marker 1: 17.0

Marker 2: 19.5

Justification

Please give a brief justification for the final mark. This part must only be completed if the agreed mark is not the average of the two marks and the examiners' marks are three or more points apart.

The second marker felt, on account of the exceptional nature of this dissertation in terms of originality, the research question posed, the interdisciplinarity, the mathematical and statistical argument, the simulation exercise and the element of original programming in MATLAB which the student learnt, that it should be rewarded at the very highest level. The first marker, though mindful of the ambition of the student and MSc marking scheme, wanted (alongside this) to have some element where the dissertation was considered at face value and, in spite of the broad coverage, to point to areas which were not fully developed. As both markers noted, the dissertation is written essentially as a chapter of a Ph.D. thesis. As noted, there are elements on this basis where the chapter would need to be revised. But as an MSc dissertation, the work is clearly of Distinction level.