BACHELOR'S THESIS EXAMINER REPORT
PPE – Bachelor's in Politics, Philosophy and Economics
Faculty of Social Sciences, Charles University

Thesis title:	Beyond Borders: A Game Theoretic Exploration of TSMC's Role in China-Taiwan Tensions
Student's name:	**Sebastian Oram**
Referee's name:	**Mgr. Jakub Tesař, Ph.D.**

Criteria	Definition	Maximum	Points
Major Criteria			
	Contribution and argument (quality of research and analysis, originality)	**50**	35
	Research question (definition of objectives, plausibility of hypotheses)	**15**	10
	Theoretical framework (methods relevant to the research question)	**15**	12
Total		*80*	57
Minor Criteria			
	Sources, literature	**10**	7
	Presentation (language, style, cohesion)	**5**	4
	Manuscript form (structure, logical coherence, layout, tables, figures)	**5**	3
Total		*20*	14
TOTAL		*100*	71

Plagiarism-check (URKUND) match score:
19% Turnitin, all sources are properly used and acknowledged.

Reviewer's commentary according to the above criteria

Overall design

The thesis focuses on the role of the Taiwanese semiconductor industry in Taiwan-China relations. The author convincingly discusses how important advanced microchips are to China and the USA, playing a role in modern great power competition. The thesis proposes to use game theoretical (GT) models to unpack the strategic intricacies involved.

The topic of the thesis is chosen well and focuses on highly important but often overlooked aspects of geopolitical competition. Throughout the theses, the author shows a good grasp of the problem and offers some genuine insights. However, the thesis has not explored some crucial aspects of the topic and the potential of GT has not been fully used.

The thesis offers a clear research question (p.7), but its hypotheses (ibid) are problematic. In my view, they should not relate to game-theoretical models, but to the studied case. E.g.,

we are not interested in what is possible with cooperative strategies (in a GT model), but whether such courses of action are available and preferred in the studied case. Moreover, key concepts present in the hypotheses are never conceptualized/discussed (e.g., credible commitments, economic interdependence), and therefore, the hypotheses cannot be tested.

The thesis works with a good number of references, but I have found only 8 academic sources. Literature review is very limited, I would expect larger scope of academic works focused on Taiwan.

Individual GT models

Median Voter Theorem – the model is definitely useful, but I see many problems with its implementation. It is unclear to me whether/how preference with respect to "sovereignty, economic interests and security concerns" (p. 12) can be modeled as a one-dimensional problem. Wouldn't it be better to work with the higher dimensional model? Further, the model definitely needs to consider the different powers of the involved actors. It is not an option (as discussed in the thesis) but a necessity since the vital assumption of MVT (all voters having the same weight (one vote) regarding influencing the result) is violated.

Prisoner's Dilemma – even though I agree with the gist of the argument, some limitations are present. First, it is not adequately explained why Taiwan (or TSMC) is not involved in the model. It is a relevant actor, with strategic choices available (moving the industry, setting specific courses with China/US), and it can be included as 3rd player in the model. Second, it is unclear why the game is analyzed as a one-shot game when the logic of IR rather suggests a repeated game. In this context, I miss the discussion of tit-for-tat as a possible, stable strategy for repeated games. Third, it is worth pointing out that the numbers in GT models are not arbitrary (p. 23) since different numbers would represent different games. In my view, it would be better to properly discuss the strategies, possible outcomes, and utilities of the players connected to those outcomes and only THEN decide which game describes the case the best (rather than starting with the assumption it is a Prisoner's Dilemma).

Game of Chicken – the discussion is well elaborated but unfortunately misses one Nash Equilibrium of the game – the one with mixed strategies. Discussing the third Nash equilibrium could probably offer novel insights into the case. In this context, it is also questionable that the thesis works with symmetric games (when, in reality, we see a lot of asymmetries). Analyzing mixed equilibrium in the asymmetric Game of Chicken would show that actors have different mixtures of cooperative and defective strategies.

Discussion of deterrence – it would be useful to distinguish between two mechanisms: 1) advanced chips important for China (China would not attack if the disruption of production/trade would harm them), 2) advanced chips important for US (China would not attack if it is convinced that the importance of chips for US would mean they will actively defend Taiwan) – since those are different mechanism they have different impacts on strategic decision-making.

Extended form game – as the author suggests, it is probably the most relevant model, but the execution is once again not perfect. First, some numeric choices seem problematic (e.g., why is l_{US} and L_{US} so close to each other, don't you expect bigger difference between attacking and defending?). But mainly, the variant with the chance move does not make much sense because the level of compromise is endogenous to the game (the actor on the move would offer specific concessions based on his alternative strategies). In my view, solving the game without the chance move for the possible level of C is better approach.

I think there is a general mismatch between what models are used and what you want to study. The question that could have been interesting is, e.g., moving the semiconductors factories abroad (to the US) – what options do individual actors have, and what is the strategic action in this respect?

Overall, the author of the thesis shows a good grasp of the studied case, but the use of the GT models is imperfect, which results in GT models providing only limited insights into the studied case.

Formal criteria

The thesis is presented in a clear manner, and the author is keen to discuss various limitations of the chosen approach. But it does not mean that it avoids some formal problems.

- The thesis uses weird formatting – it is sometimes unclear where the paragraphs end.
- The bibliographic citation of the thesis (p.3) features the wrong page count.
- It is unclear why section *4.1 Introducing Median Voter Theorem* (p. 16-17) lays out the preferences of one actor. The whole VMT chapter is presented inconsistently (it is not always clear where individual bullet points came from).
- "[M]ilitary involvement from one side and a military absence from the other" is NOT "a mixed strategy" (p.26) in a game-theoretical sense.
- The notation is often confusing.
  - Expected utility is sometimes denoted as "EU" or "E" sometimes as simply "US" (p.33)
  - EU(A|B) (p.35) is used to denote conditional utility in GT.
  - Even though "L" and "l" have different values for US and China, they appear without subscript in parts of the text (p.37,41,42)
- Even though those are details, one must be careful when working with a GT model not to get lost (or lose the reader) along the way.

Proposed grade (A-B-C-D-E-F): C

Suggested questions for the defence are:

- Based on your (game-theory informed) insight into the case, do you expect US, China, and Taiwan supports opening new TSMC fabs abroad? Why?
- Academic literature concludes that tit-for-tat (or tit-for-two-tats) is a strategy outperforming any other in repeated PD scenarios. How does this finding inform your analysis of the case?

I recommend the thesis for final defence.

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                                    Referee Signature