

Report on Bachelor Thesis

Institute of Economic Studies, Faculty of Social Sciences, Charles University

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| Student: | Jakub Bachorík |
| Advisor: | Mgr. Petr Polák, M.Sc., Ph.D. |
| Title of the thesis: | The stock market from the perspective of a Czech investor and equity home bias |

OVERALL ASSESSMENT (provided in English, Czech, or Slovak):

Short summary

This thesis claims to investigate the presence of equity home bias among Czech investors by employing the Markowitz portfolio optimization model with a rolling window approach, focusing on U.S., European, and Czech stock indices. The study examines the performance of various simple investment strategies over time and evaluates the impact of factors like rolling window length and exchange rate volatility on portfolio optimization. The main findings suggest that longer window lengths and exchange rate fluctuations generally reduce the effectiveness of mean-variance optimization. While U.S. equities were predominantly favored in successful strategies, the importance of the Czech PX index has increased in recent years. Furthermore, an internet questionnaire survey of Czech investors is performed. It is supposed to indicate a weak preference for domestic equities with an average portfolio allocation of 20% to local stocks, contradicting the typical equity home bias found in other markets in the literature. The thesis concludes that apparently well-informed Czech investors tend to prioritize perceived higher returns from foreign equities, particularly those in the U.S., over domestic options.

Contribution

The main contribution of the thesis can be found at the level of the personal development of the student's skills and knowledge. The student got practically familiar with the basics of portfolio optimization and techniques of financial modeling. He also got handy with the management of financial market data obtained from the Datastream database, the Czech National Bank, and demographic data from the Czech Statistical Office. The "scientific" value added to the thesis is, on the other hand, rather difficult to evaluate. The author claims that the main contribution lies in considering the Czech-market-specific risk-free rate, the incorporation of the exchange rate into the model, and longer intervals based on which the portfolio optimization is conducted. While the first two aspects should be standards in any serious portfolio performance modeling rather than contributive value-added, the latter is nothing more than a relatively trivial sensitivity exercise, not really extending the approach. Above that, e.g., the impact of inflation, as far as I understand, is not considered at all, so the analysis only suggests conclusions in nominal terms and suggests little about the real performance and potentially important differences between the investment "strategies" over the long-term horizon. The numerical results of the analysis are generally reasonably described, but often, a further economic analysis, a deeper potential explanation, or a more careful interpretation should have been provided.

Moreover, while the thesis claims to study the behavioral phenomenon of equity home bias, it actually does this completely vaguely and without any statistical or sociological rigor known from the literature on home equity bias. The main means of analysis is an online questionnaire designed and distributed by the student online among some not-well-specified groups of investors on a well-known (undisclosed) social network. Not only is the design of the survey questionable in general, and insufficient information about its details is provided, but also its results are interpreted vaguely, and it is hard to believe they really represent a representative contribution, as the author finally concludes as the main results of the equity home bias analysis: *"The weighting of the PX index should be in the range of 0-58% for 2024, with the S&P 500 index accounting for the rest. The mean value of the share of Czech stocks in the portfolio held by the surveyed investors was 20%, therefore we could not confirm the existence of equity home bias in our sample."*

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Methods

The basic portfolio mean-variance optimization approach of Markowitz (1952) and Sharpe (1964) is used under a set of reasonable assumptions defined in Section 3.1. I only do not understand (and I find this not a very reasonable assumption among even layman Czech equity investors) why the portfolio rebalance is only conducted annually if the investments are made monthly in the model. The main analysis is markedly trivialized as only three “assets” are considered, represented by the S&P 500 Index, STOXX Europe 600 Index, and PX Index (later slightly extended by a sectoral division of the former two as a short additional analysis). The considered investment strategies are also very limited, covering “all-in” to single indices, an equally weighted portfolio, and mean-variance optimization based on several rolling window lengths. While these different lengths (from 3 to 18 years = the full sample) are presented as different “strategies” and one of the main contributions of the analysis, to my mind, they should rather be presented aside as the sensitivity analysis regarding the parametrization of the main approach, and their impact should be interpreted and extracted more.

The design of the questionnaire has not been revealed. Some questions and the scale for answers are likely described in Section 4.2, but then another new question is evaluated in connection with Figure 5.8. The complete questionnaire and at least some overall statistics of the data collected should have been attached as an Appendix, not only arbitrarily evaluated in the text.

Literature

The literature section provides a selection of some important papers on the topic of equity home bias, which is, finally, not really the main topic of the thesis. The other related areas (e.g. the methodological one: portfolio optimization) are almost not considered. The Chapter describes the findings of those papers in one single section in a step-by-step fashion without any serious attempt for additional analysis, classification of the results, or a “compare and contrast” approach. The form of citations for multiple sources at once is often incorrect (see, e.g., the second paragraph of the Introduction).

Manuscript form

The main potential issue might be the number of pages. While the minimum is 25 “standard pages” for English-written bachelor theses (without bibliography and appendices), the thesis consists of roughly 19–20 full pages in the IES LaTeX template (while I am not sure if the template page follows the definition of the “standard page”). I also could not find any information about the count of characters in the main text (it should be 45 000, with space, at the minimum). The thesis is otherwise written in reasonable English and typeset in LaTeX. There are only a few typos in the main text. There are a few typographical issues in the Bibliography section. I could not find references to Appendix Tabs. B.1 and B.2 in the text. Figures are well-designed and reasonably described, and the simple graphics are easy to look through, but additional notes to explain details and make the figures stand-alone are generally not provided. However, the figures and tables are generally ill-positioned in the text (see, e.g., pg. 21–23, which only contain randomly positioned objects).

Overall evaluation and suggested questions for the discussion during the defense

If the page count of the thesis meets the Faculty criteria, I personally believe the assessed work still fulfills the lower bound of the IES, Faculty of Social Sciences, Charles University bachelor-level standards. Thus, I can recommend it for the defense and suggest a grade of E.

The results of the Turnitin analysis do not indicate significant text similarity with other available sources.

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Additional topics for clarification and discussion:

- Could you clarify the seeming mismatch between using both the simple and logarithmic returns in the analysis (discussed in the last paragraph of pg. 10)?
- How could/would the incorporation of the annual inflation level in the Czech Republic influence the whole analysis and the main results?
- The (technical) details of the implementation of the currency exchange rates (volatility) are not described in the thesis. Can you explain this now?
- Why would you expect that incorporating exchange rate volatility should generally improve model performance? (see Conclusion, the third paragraph). Explain.
- On pg. 22, the author states that *“Strategies using index returns denominated in Czech crowns performed significantly worse for all window lengths.”* Can you clarify if/how you assessed the statistical significance of the difference?
- Explaining these results, the author states that *“The main cause was inaccurate covariance calculation, which was biased by exchange rate volatility.”* Can you explain the (economic, technical, or intuitive) principles of why and how *“the inclusion of the exchange rate in the portfolio selection according to mean-variance optimization had a negative effect on model performance.”*
- Even after multiple tries, I still do not understand Figure 5.7. What do the colors and the heights of bins represent? Clarify, please.

SUMMARY OF POINTS AWARDED (for details, see below):

| CATEGORY | POINTS |
|---|---------------------------------------|
| <i>Contribution</i> (max. 30 points) | 12 |
| <i>Methods</i> (max. 30 points) | 14 |
| <i>Literature</i> (max. 20 points) | 12 |
| <i>Manuscript Form</i> (max. 20 points) | 16 (? if page count is OK, see above) |
| TOTAL POINTS (max. 100 points) | 54 |
| GRADE (A – B – C – D – E – F) | E |

NAME OF THE REFEREE: Jiří Kukačka

DATE OF EVALUATION: 23. 8. 2024

Referee Signature

EXPLANATION OF CATEGORIES AND SCALE:

CONTRIBUTION: *The author presents original ideas on the topic demonstrating critical thinking and ability to draw conclusions based on the knowledge of relevant theory and empirics. There is a distinct value added of the thesis.*

METHODS: *The tools used are relevant to the research question being investigated, and adequate to the author's level of studies. The thesis topic is comprehensively analyzed.*

LITERATURE REVIEW: *The thesis demonstrates author's full understanding and command of recent literature. The author quotes relevant literature in a proper way.*

MANUSCRIPT FORM: *The thesis is well structured. The student uses appropriate language and style, including academic format for graphs and tables. The text effectively refers to graphs and tables and disposes with a complete bibliography.*

Overall grading:

| TOTAL | GRADE |
|----------|-------|
| 91 – 100 | A |
| 81 - 90 | B |
| 71 - 80 | C |
| 61 – 70 | D |
| 51 – 60 | E |
| 0 – 50 | F |