TITLE

Supplementary Information: Quantifying Trading Behavior in Financial Markets Using *Google Trends*

AUTHORS AND AFFILIATIONS

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Search Volume Data — The service *Google Trends* analyses a portion of *Google* web searches to compute how many searches have been done for specific terms, relative to the total number of searches done on *Google* over time. This analysis indicates the likelihood of a random user to search for a particular search term from a certain location at a certain time. Note that *Google Trends* only provides data relating to search terms for which traffic exceeds a certain threshold, so that those with low search volume will not appear. The *Google Trends* system also eliminates repeated queries from a single user over a short period of time, so that the level of interest is not artificially impacted by such behavior[1]. *Google Trends* does not provide search volume at a daily granularity, other than for extremely frequent search terms. We therefore conduct our analyses at a weekly granularity, for which data relating to a much larger set of search terms is available.

REFERENCES

1. **Google Trends** [http://support.google.com/trends] Accessed in Mar 2013.

FIGURES

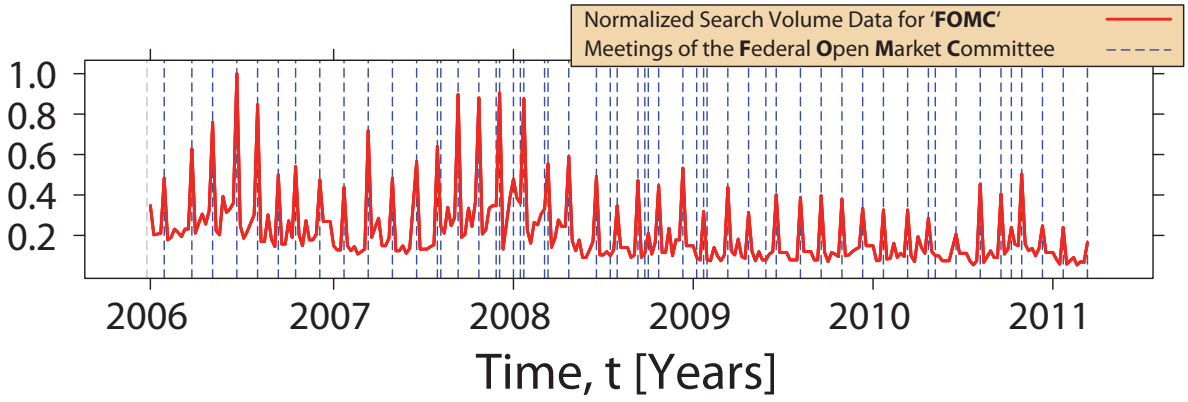

Figure S1. Empirical evidence of data consistency, based on normalized search volume data for the search term *FOMC*, which is the commonly used term for the *Federal Open Market Committee*. The time series is normalized by its maximum. This committee is part of the *U.S. Federal Reserve System* and makes core decisions during its regular meetings about interest rates and the increase of money supply. The meeting dates, which we retrieved from http://www.federalreserve.gov/monetarypolicy/fomccalendars.htm on 15 May 2011, are represented by vertical lines and coincide with an increase in the volume of the search term *FOMC*. We see no delay between sharp peaks in search volume data and the sequence of historical *FOMC* meeting dates.

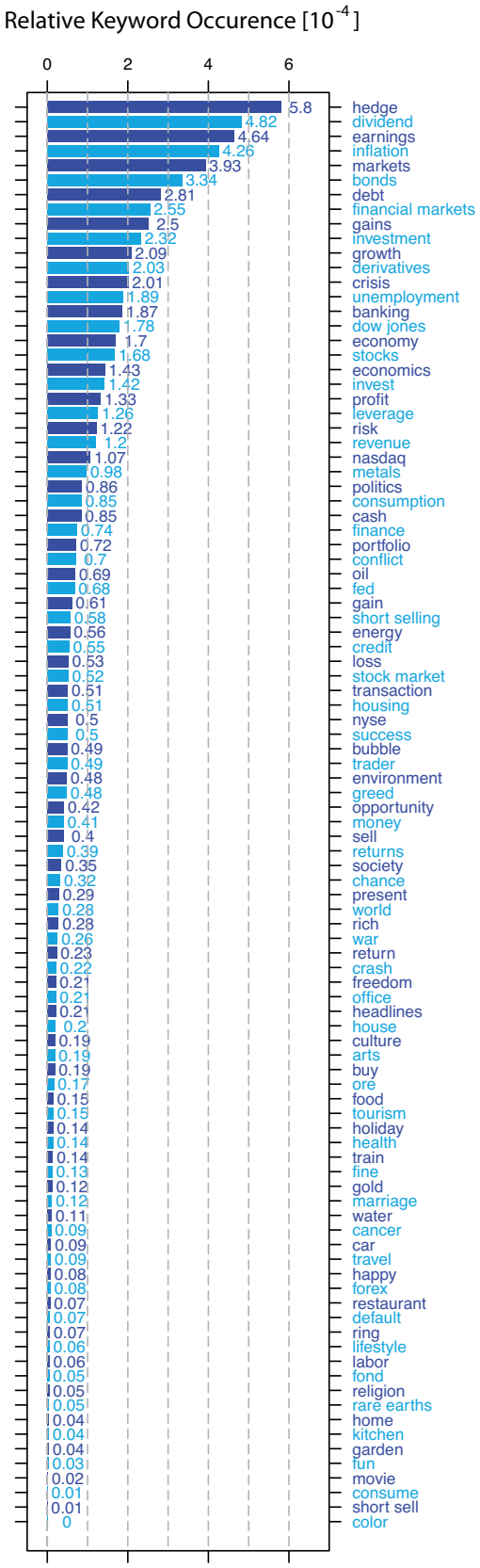

Figure S2. How related are search terms to the topic of finance? We quantify financial relevance by calculating the frequency of each search term in the online edition of the *Financial Times* (http://www.ft.com) from August 2004 to June 2011, normalized by the number of *Google* hits (http://www.google.com) for each search term.

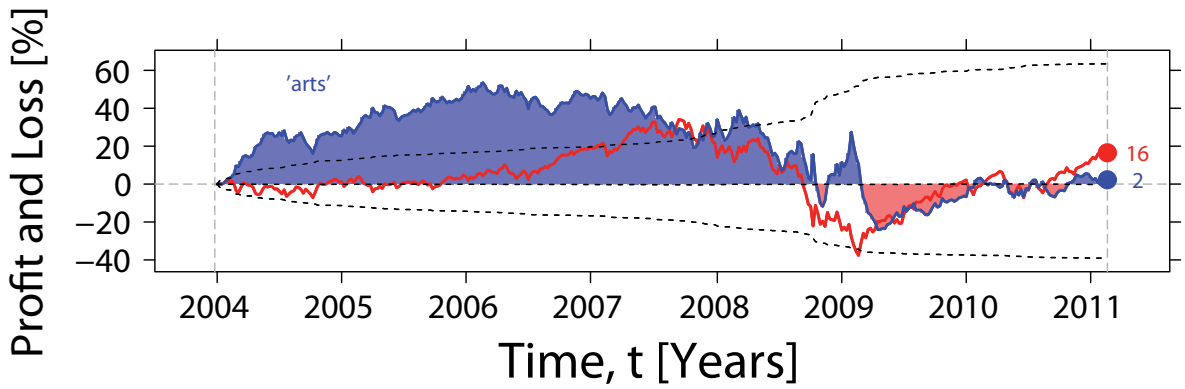

Figure S3. Profit and loss for an investment strategy based on the volume of the search term *arts* with $\Delta t = 3$ weeks.

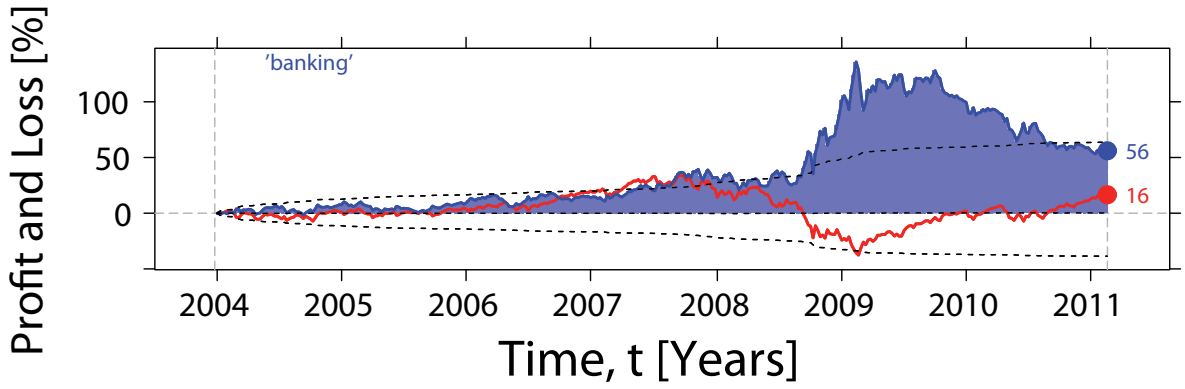

Figure S4. Profit and loss for an investment strategy based on the volume of the search term *banking* with $\Delta t = 3$ weeks.

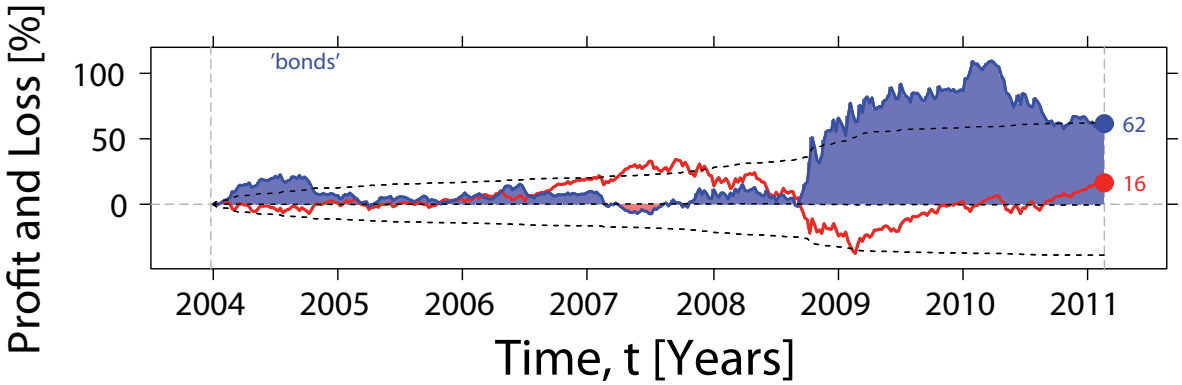

Figure S5. Profit and loss for an investment strategy based on the volume of the search term *bonds* with Δt = 3 weeks.

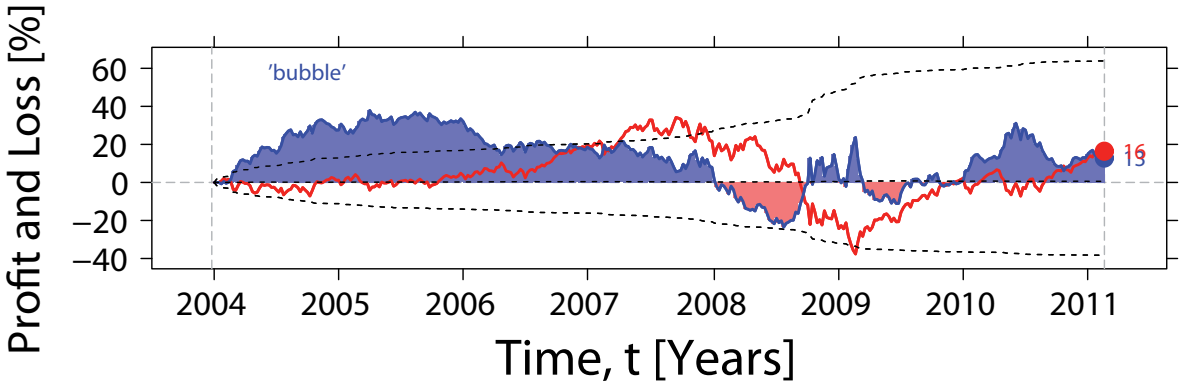

Figure S6. Profit and loss for an investment strategy based on the volume of the search term *bubble* with Δt = 3 weeks.

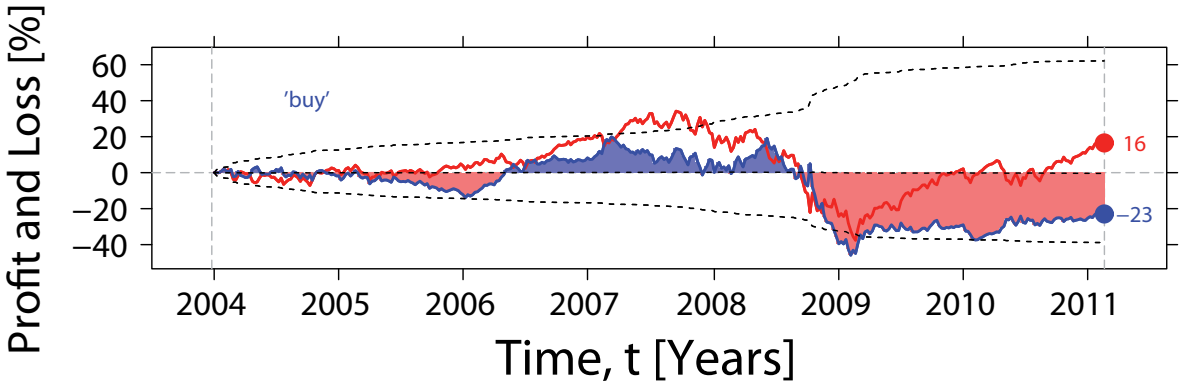

Figure S7. Profit and loss for an investment strategy based on the volume of the search term *buy* with $\Delta t = 3$ weeks.

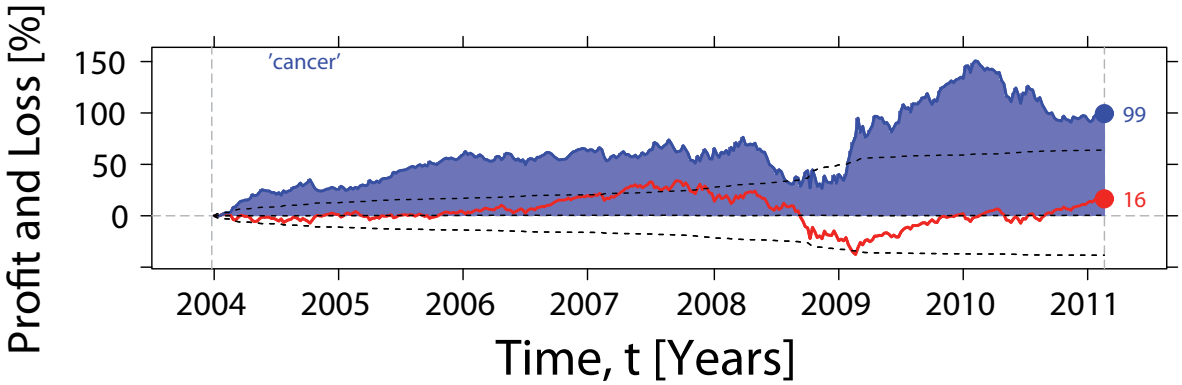

Figure S8. Profit and loss for an investment strategy based on the volume of the search term *cancer* with $\Delta t = 3$ weeks.

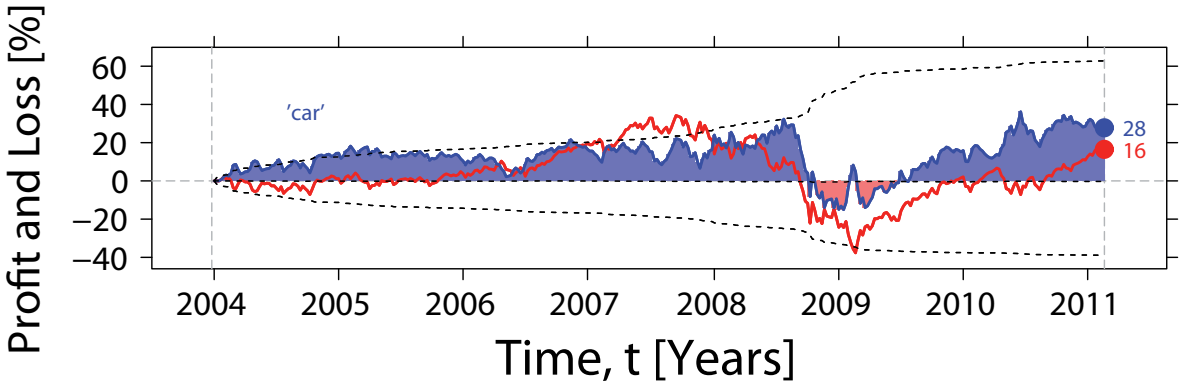

Figure S9. Profit and loss for an investment strategy based on the volume of the search term *car* with Δt = 3 weeks.

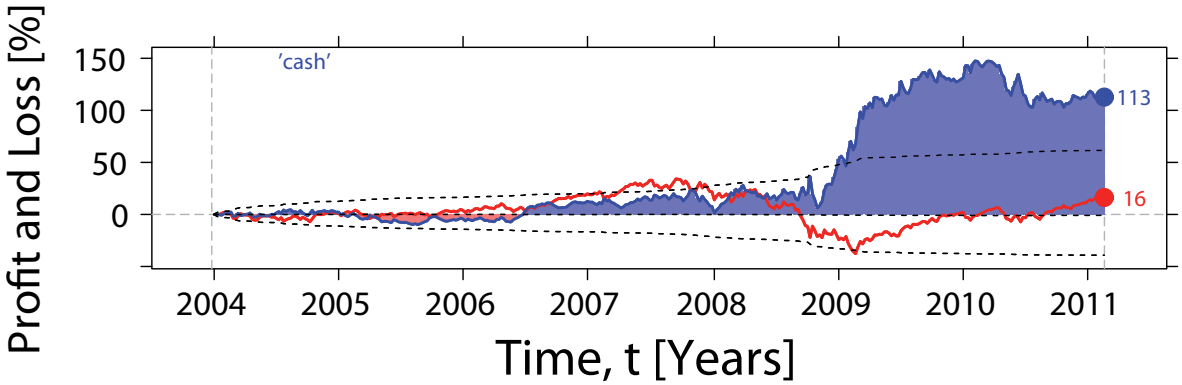

Figure S10. Profit and loss for an investment strategy based on the volume of the search term *cash* with Δt = 3 weeks.

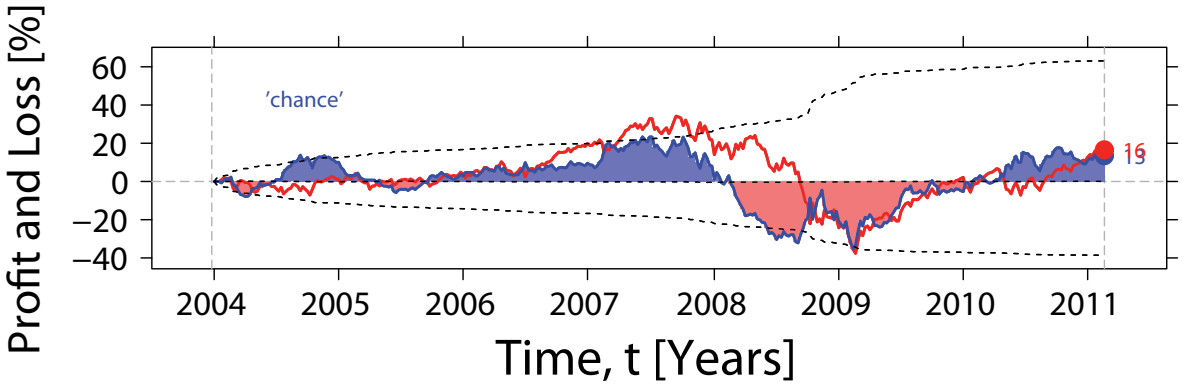

Figure S11. Profit and loss for an investment strategy based on the volume of the search term *chance* with $\Delta t = 3$ weeks.

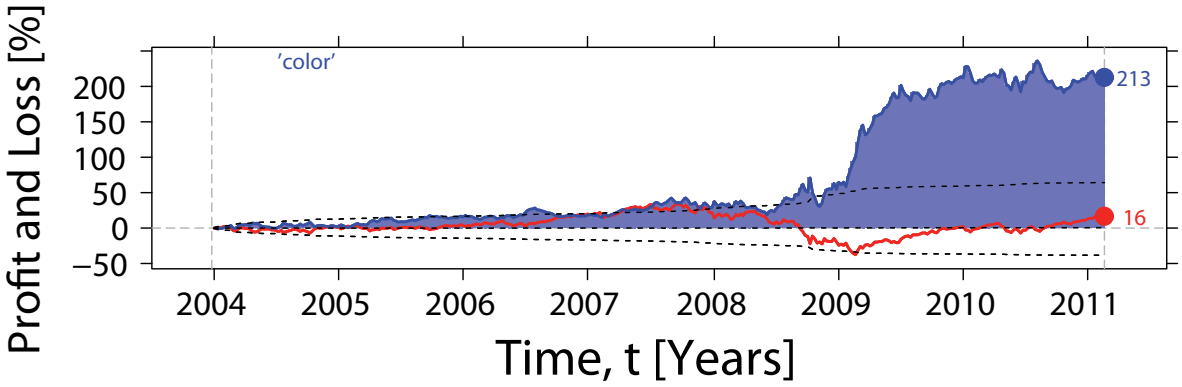

Figure S12. Profit and loss for an investment strategy based on the volume of the search term *color* with $\Delta t = 3$ weeks.

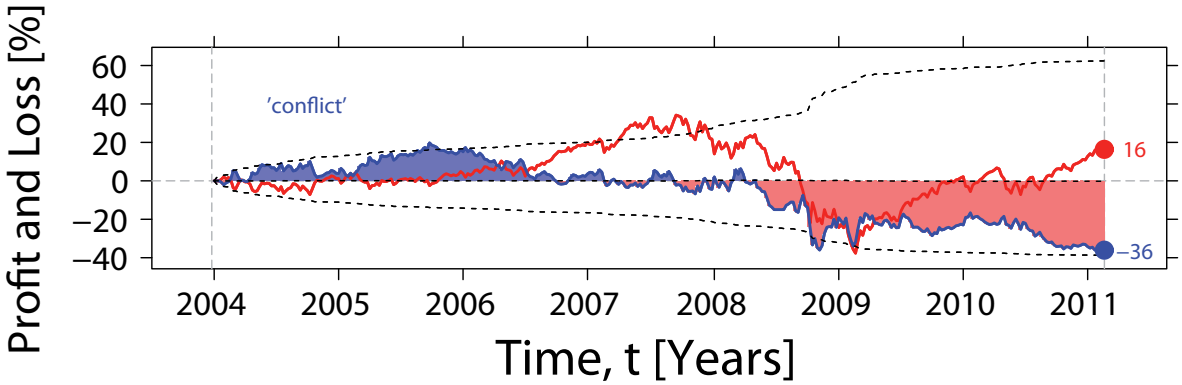

Figure S13. Profit and loss for an investment strategy based on the volume of the search term *conflict* with $\Delta t = 3$ weeks.

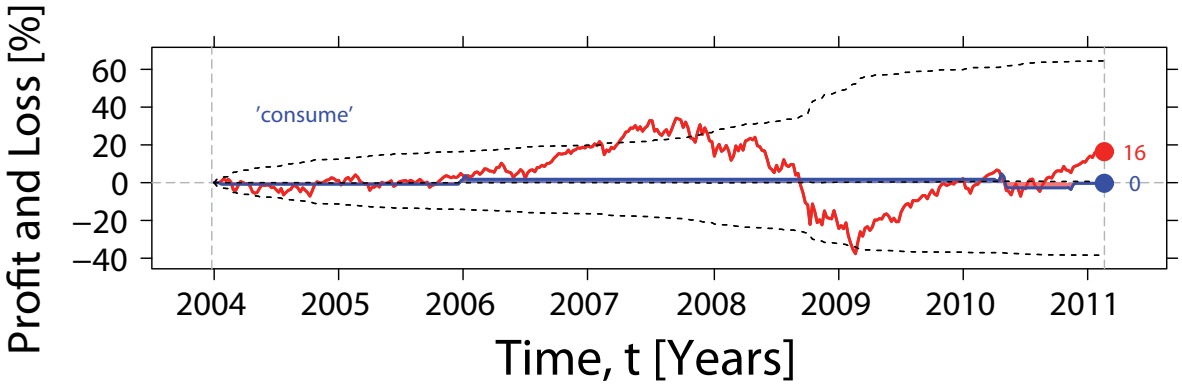

Figure S14. Profit and loss for an investment strategy based on the volume of the search term *consume* with $\Delta t = 3$ weeks.

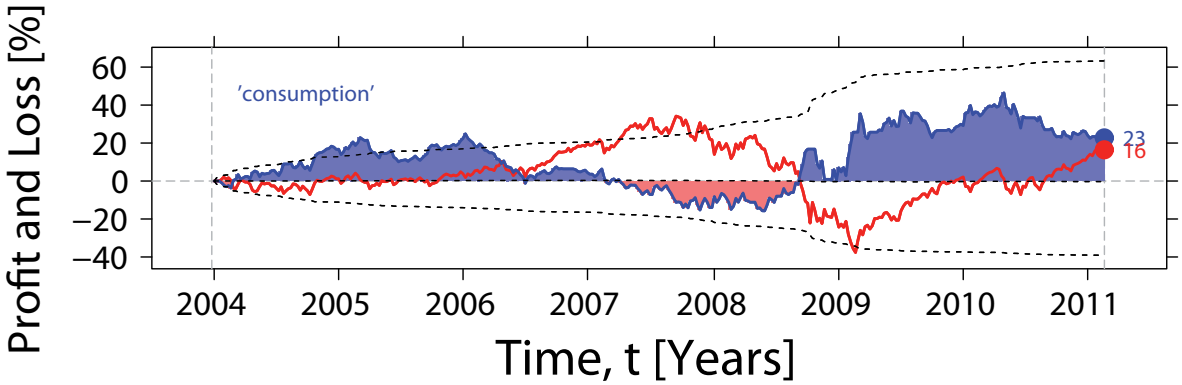

Figure S15. Profit and loss for an investment strategy based on the volume of the search term *consumption* with Δt = 3 weeks.

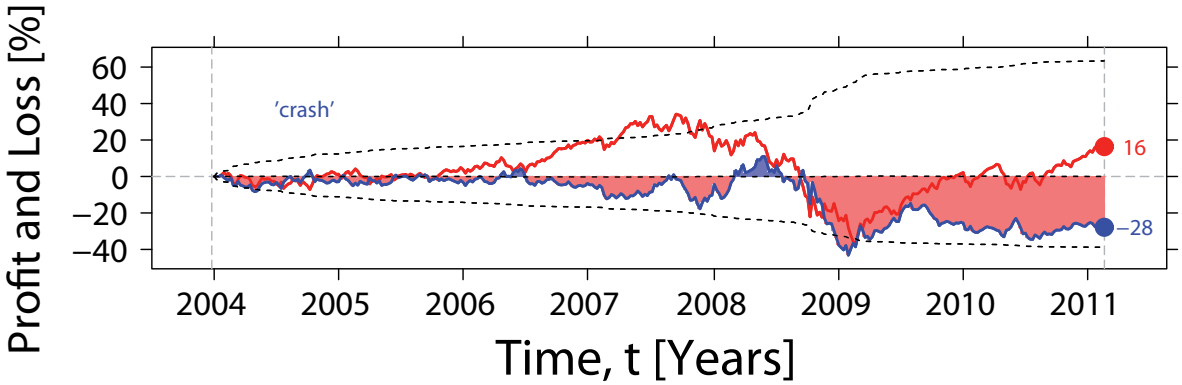

Figure S16. Profit and loss for an investment strategy based on the volume of the search term *crash* with Δt = 3 weeks.

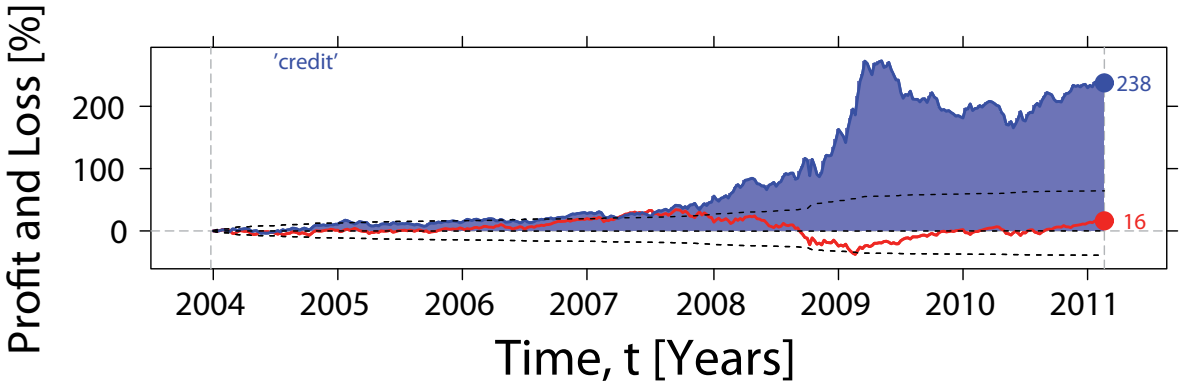

Figure S17. Profit and loss for an investment strategy based on the volume of the search term *credit* with $\Delta t = 3$ weeks.

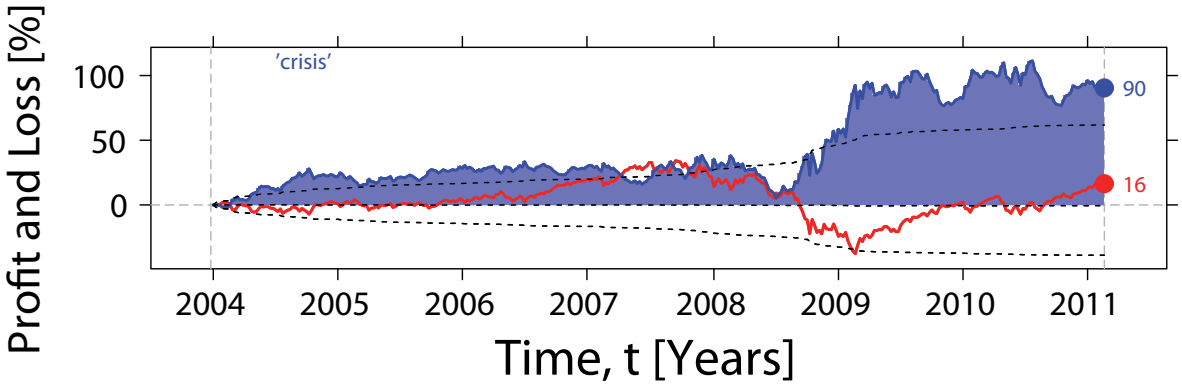

Figure S18. Profit and loss for an investment strategy based on the volume of the search term *crisis* with $\Delta t = 3$ weeks.

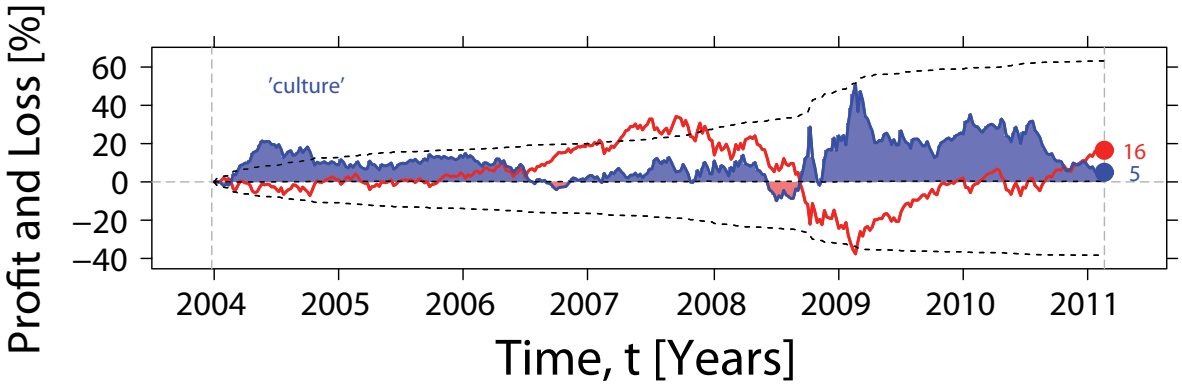

Figure S19. Profit and loss for an investment strategy based on the volume of the search term *culture* with $\Delta t = 3$ weeks.

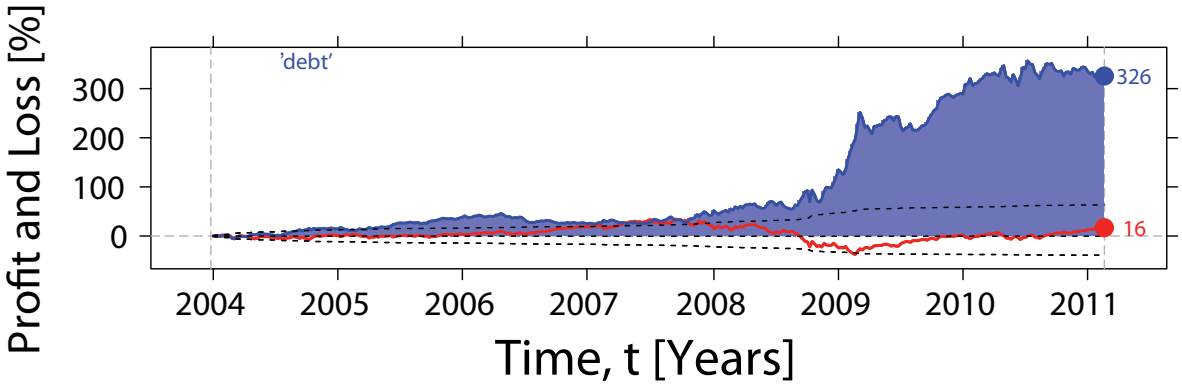

Figure S20. Profit and loss for an investment strategy based on the volume of the search term *debt* with $\Delta t = 3$ weeks.

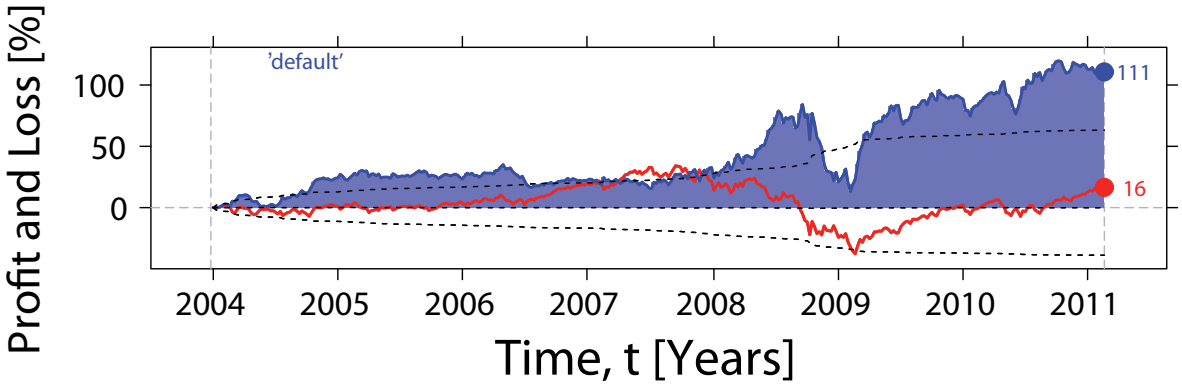

Figure S21. Profit and loss for an investment strategy based on the volume of the search term *default* with $\Delta t = 3$ weeks.

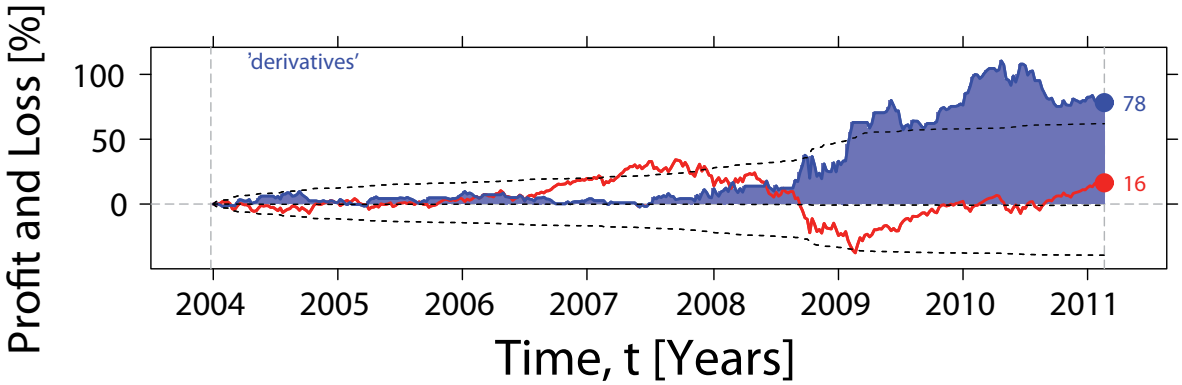

Figure S22. Profit and loss for an investment strategy based on the volume of the search term *derivatives* with $\Delta t = 3$ weeks.

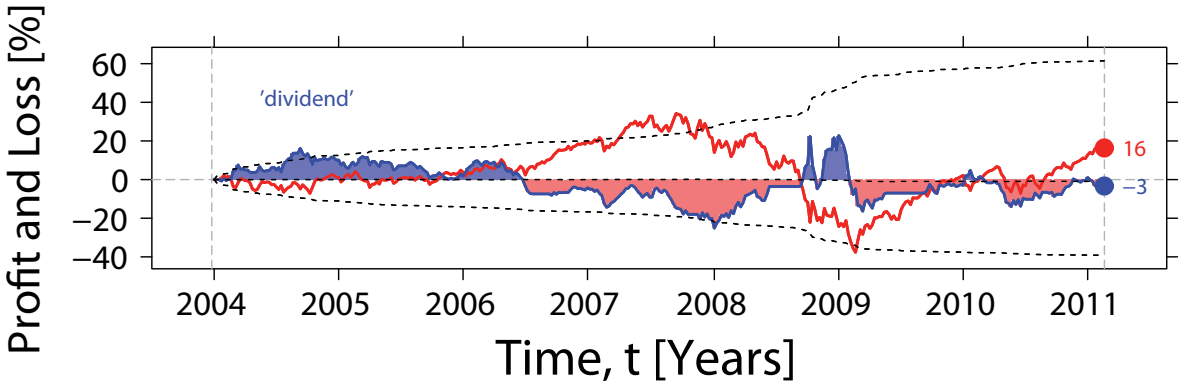

Figure S23. Profit and loss for an investment strategy based on the volume of the search term *dividend* with $\Delta t = 3$ weeks.

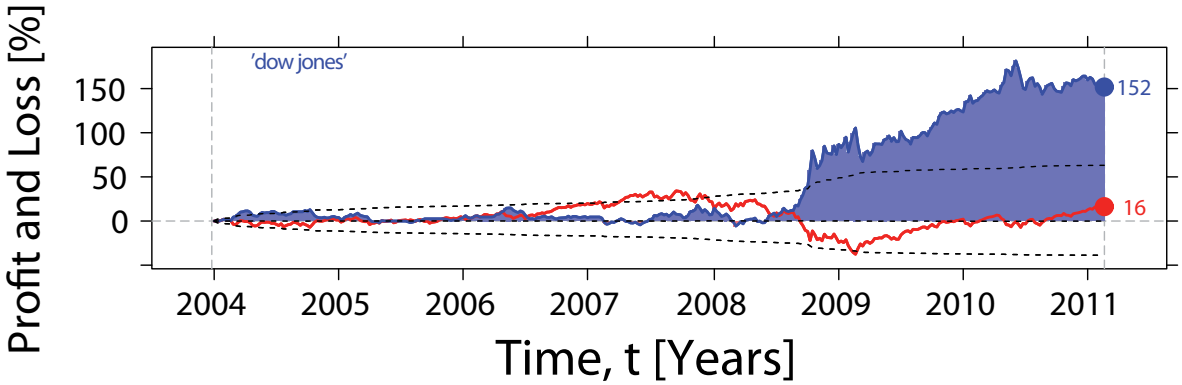

Figure S24. Profit and loss for an investment strategy based on the volume of the search term *dow jones* with $\Delta t = 3$ weeks.

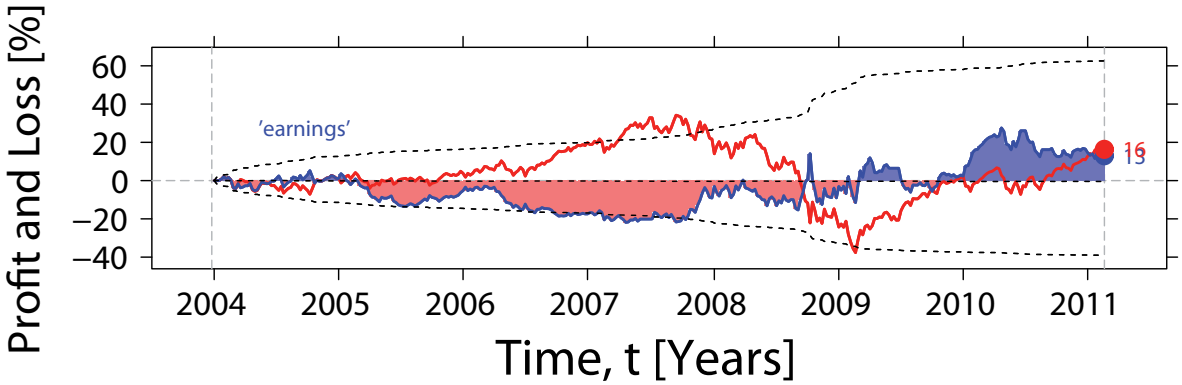

Figure S25. Profit and loss for an investment strategy based on the volume of the search term *earnings* with $\Delta t = 3$ weeks.

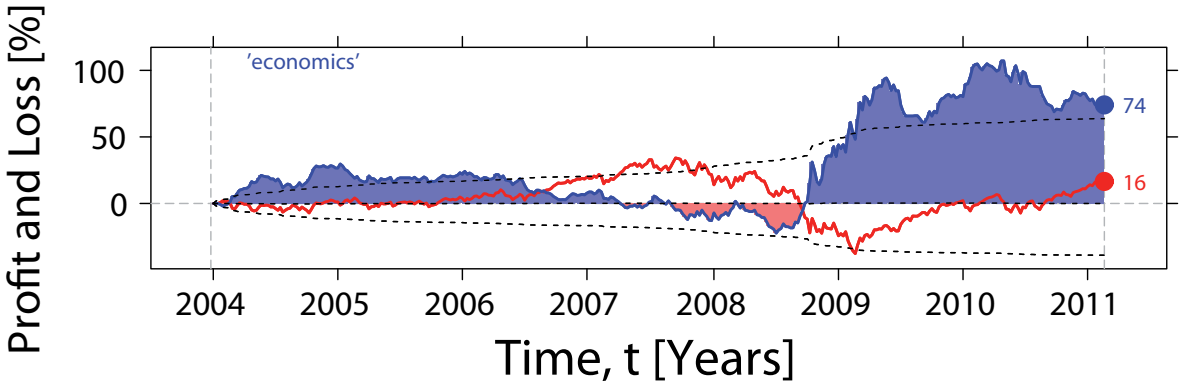

Figure S26. Profit and loss for an investment strategy based on the volume of the search term *economics* with $\Delta t = 3$ weeks.

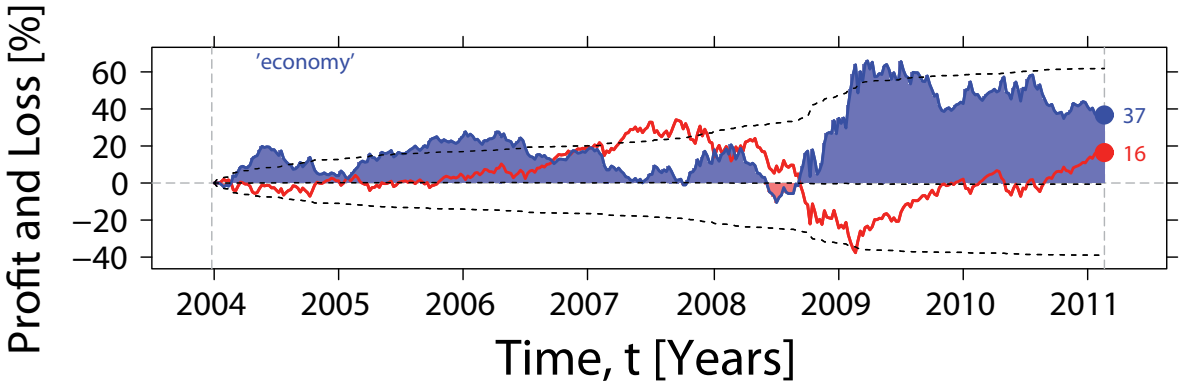

Figure S27. Profit and loss for an investment strategy based on the volume of the search term *economy* with $\Delta t = 3$ weeks.

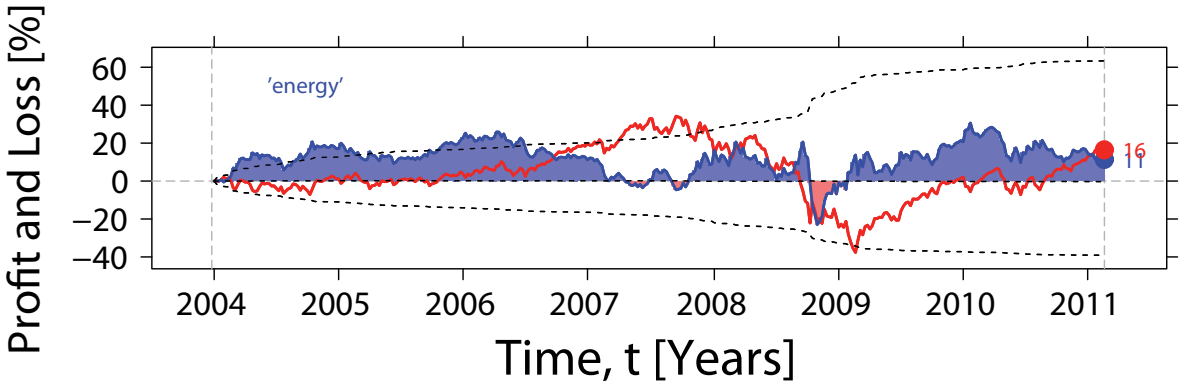

Figure S28. Profit and loss for an investment strategy based on the volume of the search term *energy* with $\Delta t = 3$ weeks.

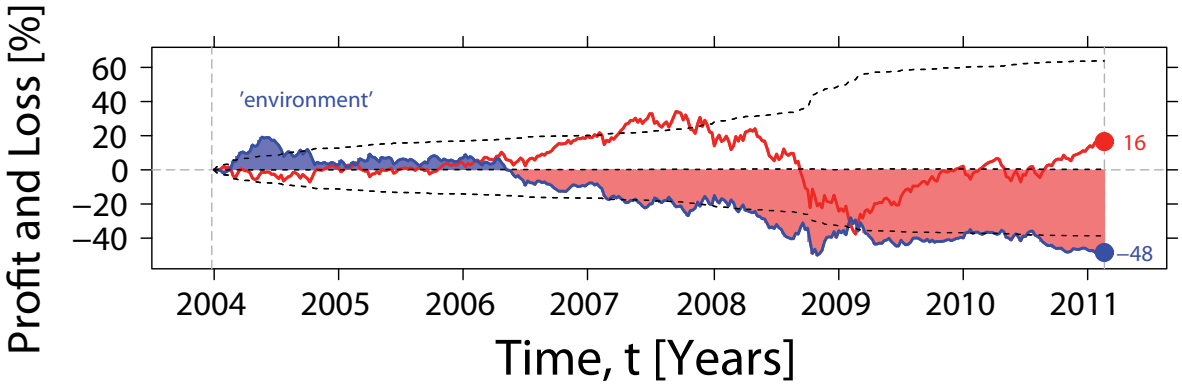

Figure S29. Profit and loss for an investment strategy based on the volume of the search term *environment* with $\Delta t = 3$ weeks.

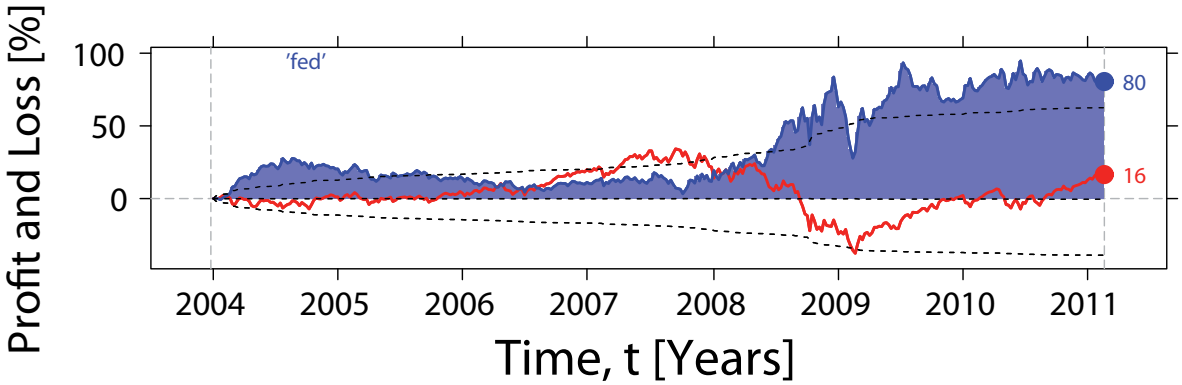

Figure S30. Profit and loss for an investment strategy based on the volume of the search term *fed* with $\Delta t = 3$ weeks.

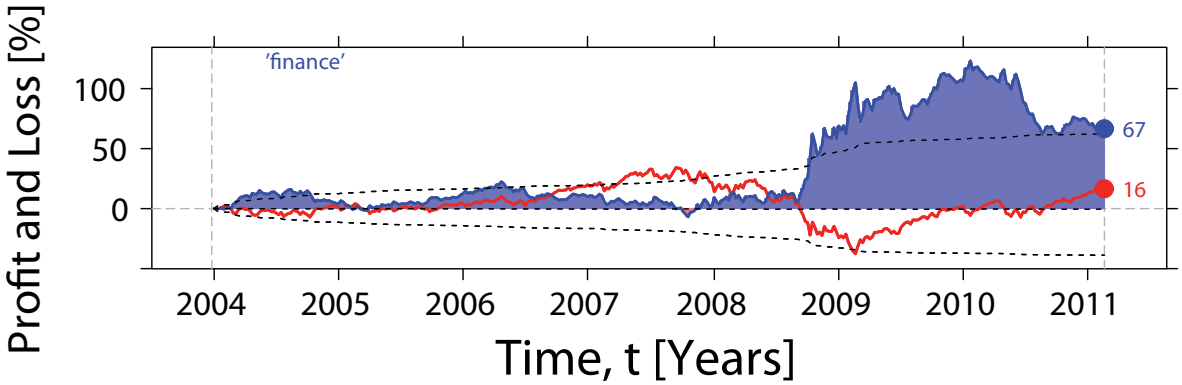

Figure S31. Profit and loss for an investment strategy based on the volume of the search term *finance* with $\Delta t = 3$ weeks.

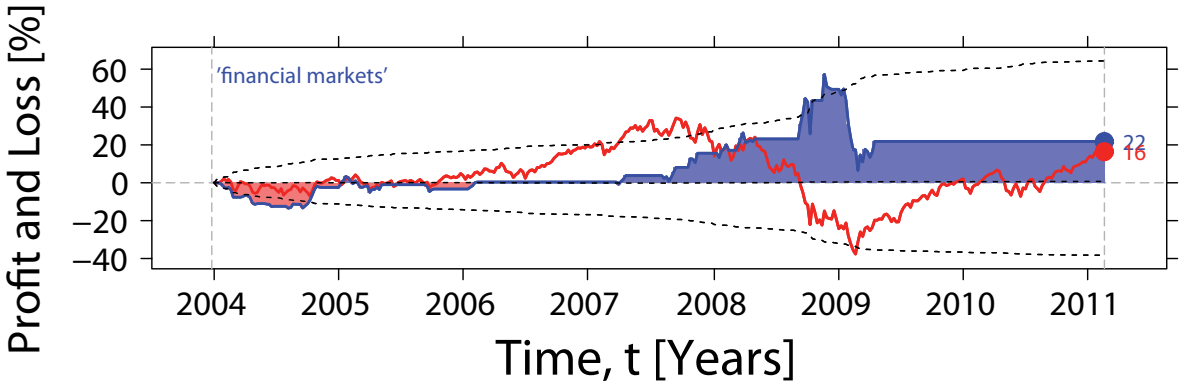

Figure S32. Profit and loss for an investment strategy based on the volume of the search term *financial markets* with $\Delta t = 3$ weeks.

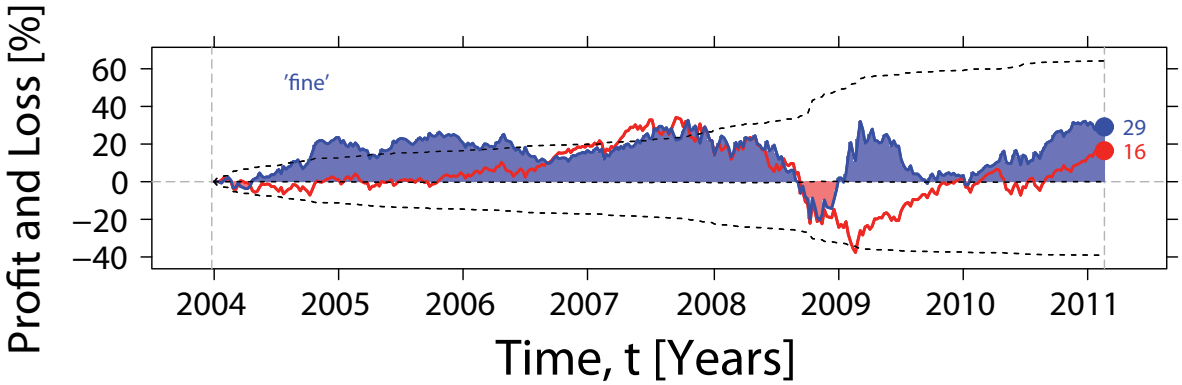

Figure S33. Profit and loss for an investment strategy based on the volume of the search term *fine* with $\Delta t = 3$ weeks.

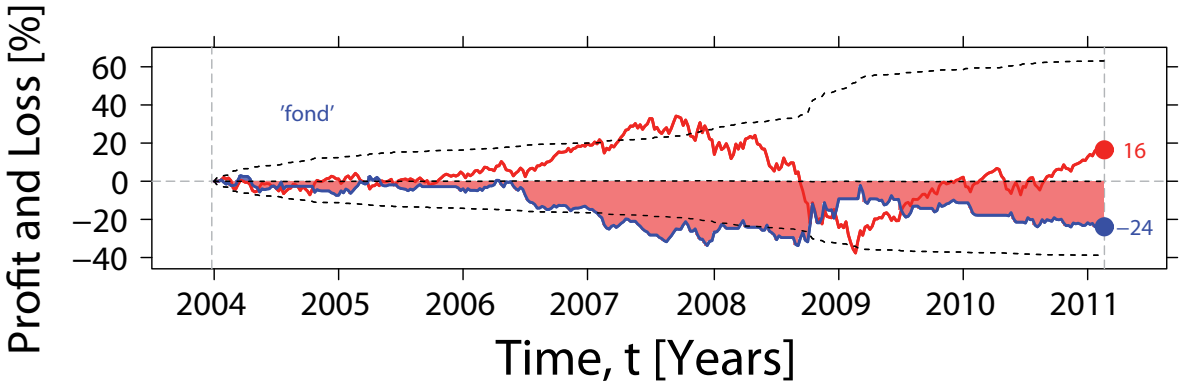

Figure S34. Profit and loss for an investment strategy based on the volume of the search term *fond* with $\Delta t = 3$ weeks.

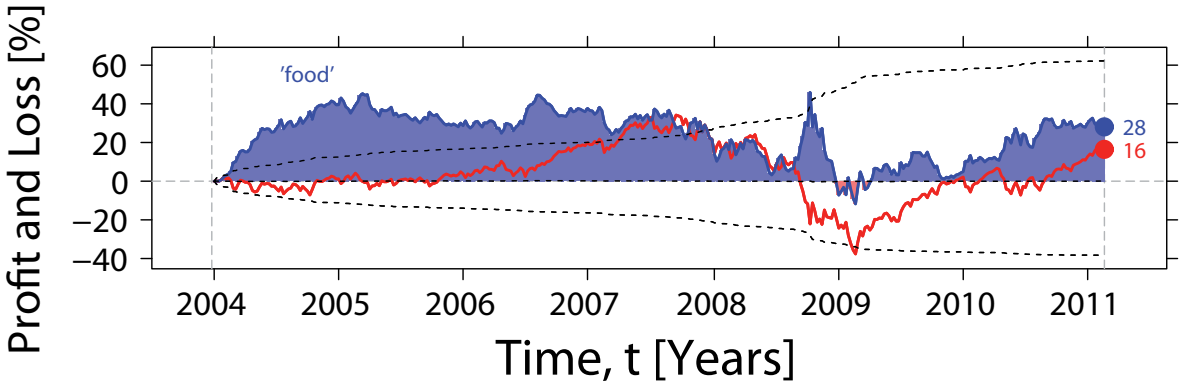

Figure S35. Profit and loss for an investment strategy based on the volume of the search term *food* with $\Delta t = 3$ weeks.

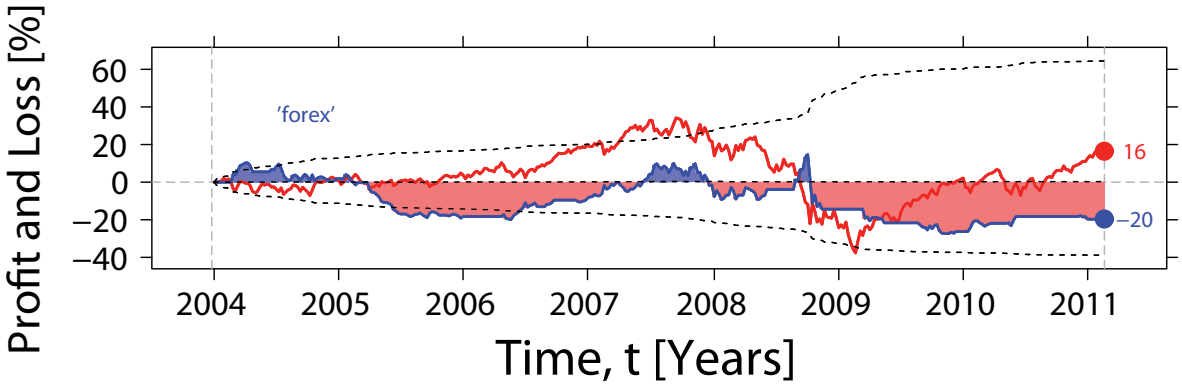

Figure S36. Profit and loss for an investment strategy based on the volume of the search term *forex* with $\Delta t = 3$ weeks.

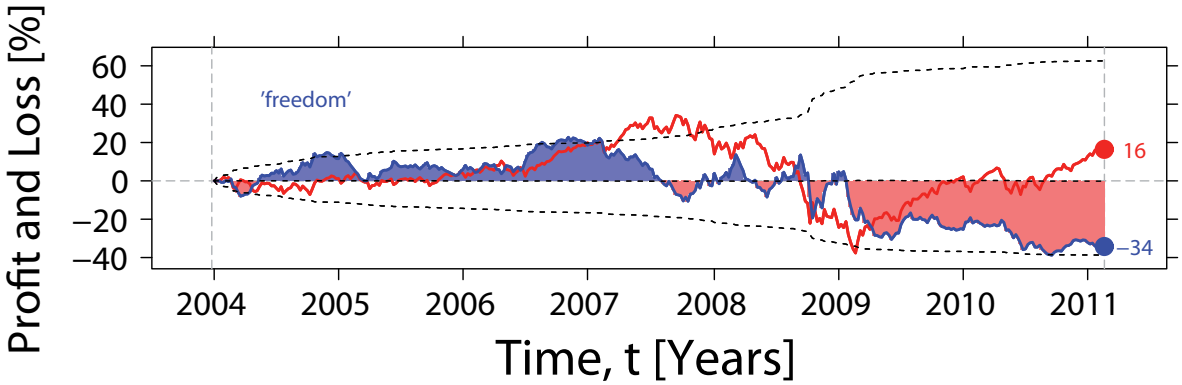

Figure S37. Profit and loss for an investment strategy based on the volume of the search term *freedom* with $\Delta t = 3$ weeks.

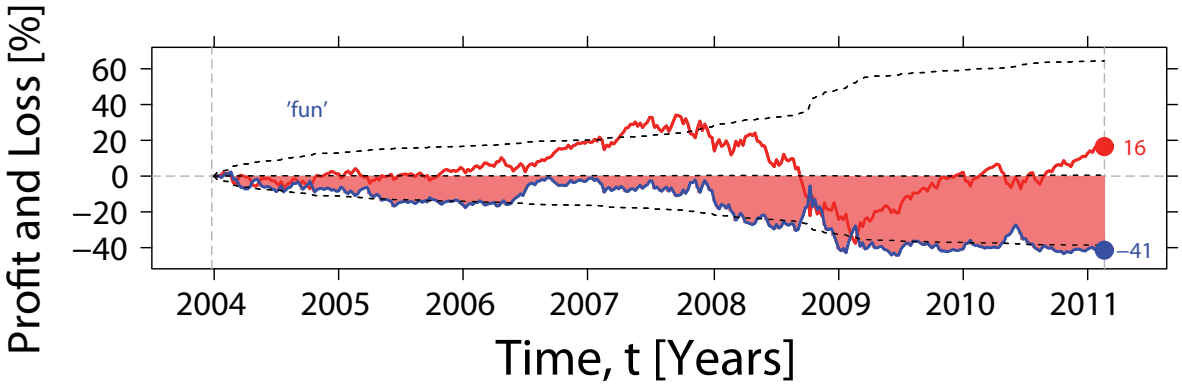

Figure S38. Profit and loss for an investment strategy based on the volume of the search term *fun* with $\Delta t = 3$ weeks.

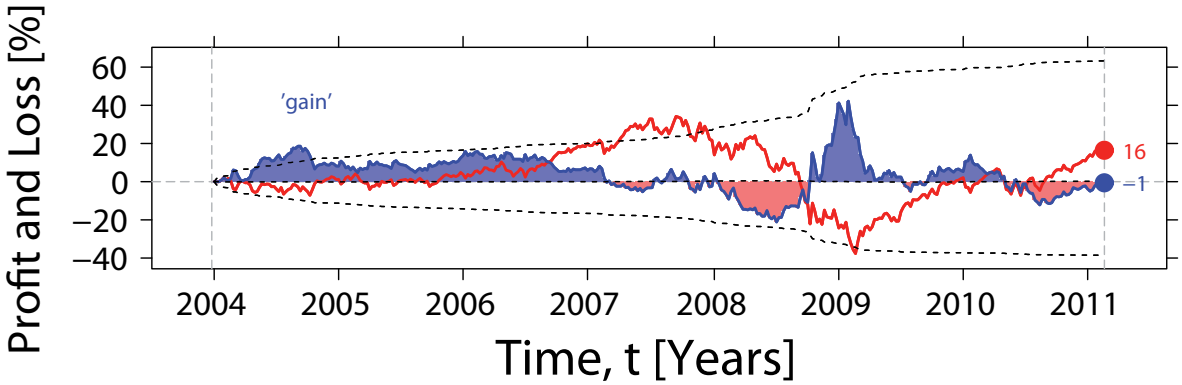

Figure S39. Profit and loss for an investment strategy based on the volume of the search term *gain* with $\Delta t = 3$ weeks.

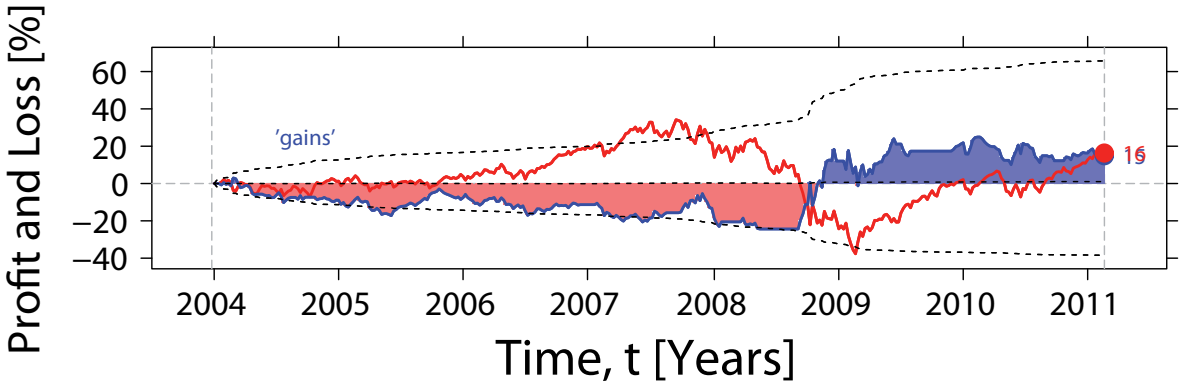

Figure S40. Profit and loss for an investment strategy based on the volume of the search term *gains* with $\Delta t = 3$ weeks.

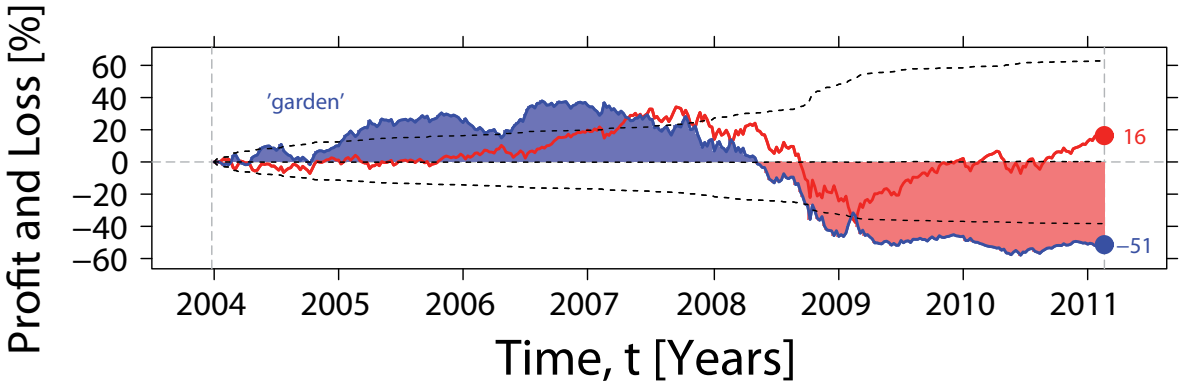

Figure S41. Profit and loss for an investment strategy based on the volume of the search term *garden* with $\Delta t = 3$ weeks.

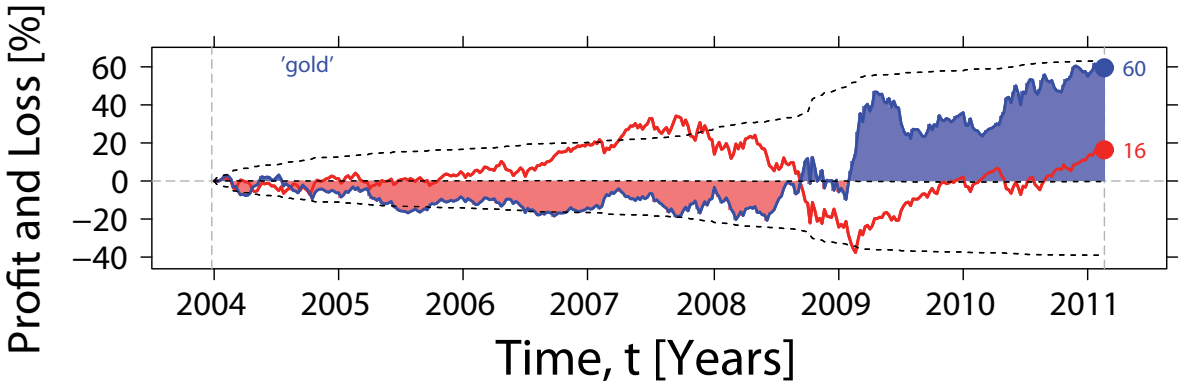

Figure S42. Profit and loss for an investment strategy based on the volume of the search term *gold* with $\Delta t = 3$ weeks.

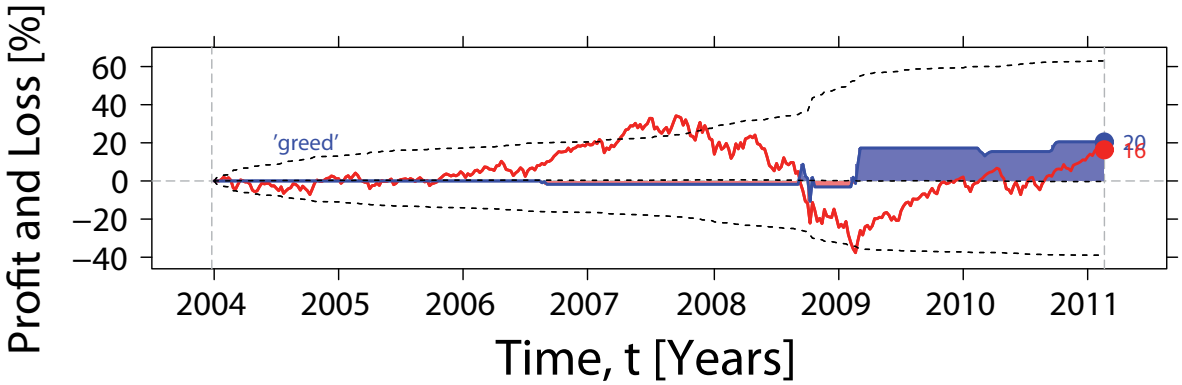

Figure S43. Profit and loss for an investment strategy based on the volume of the search term *greed* with $\Delta t = 3$ weeks.

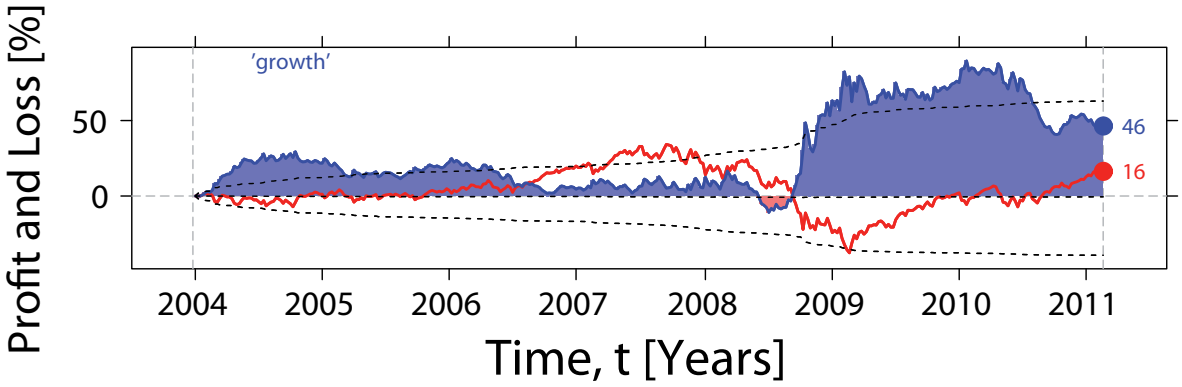

Figure S44. Profit and loss for an investment strategy based on the volume of the search term *growth* with $\Delta t = 3$ weeks.

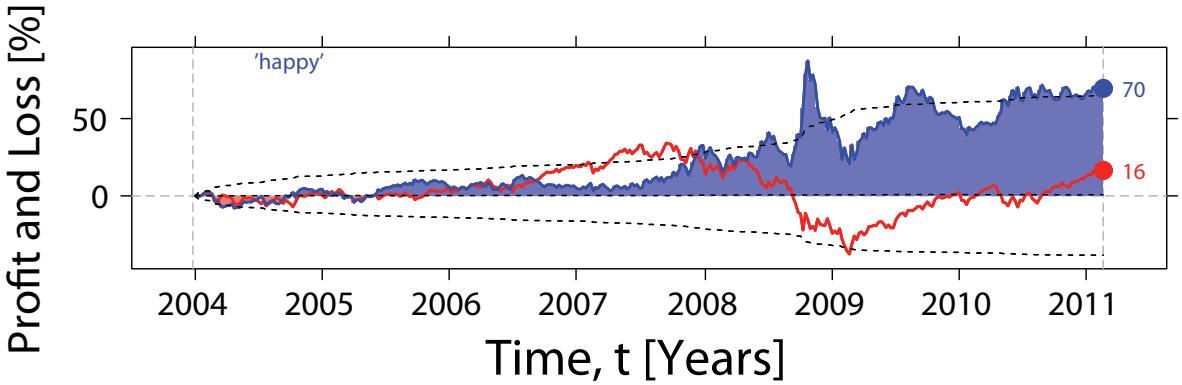

Figure S45. Profit and loss for an investment strategy based on the volume of the search term *happy* with $\Delta t = 3$ weeks.

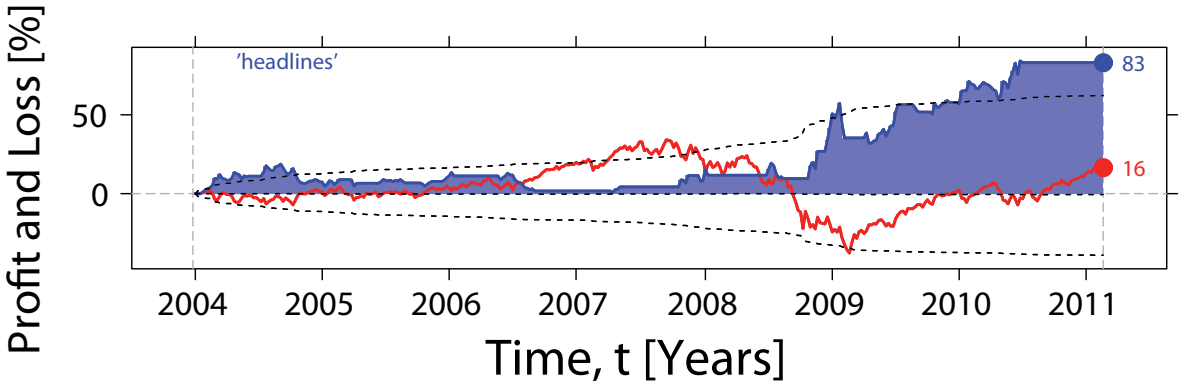

Figure S46. Profit and loss for an investment strategy based on the volume of the search term *headlines* with $\Delta t = 3$ weeks.

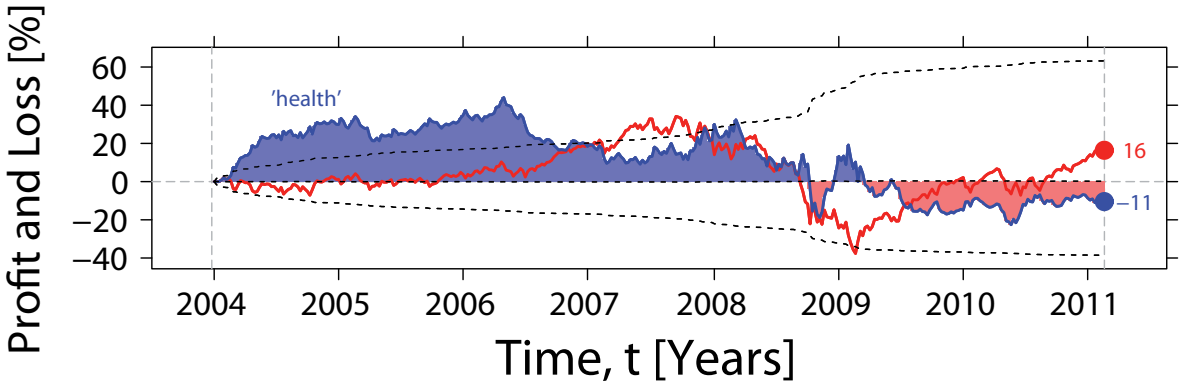

Figure S47. Profit and loss for an investment strategy based on the volume of the search term *health* with $\Delta t = 3$ weeks.

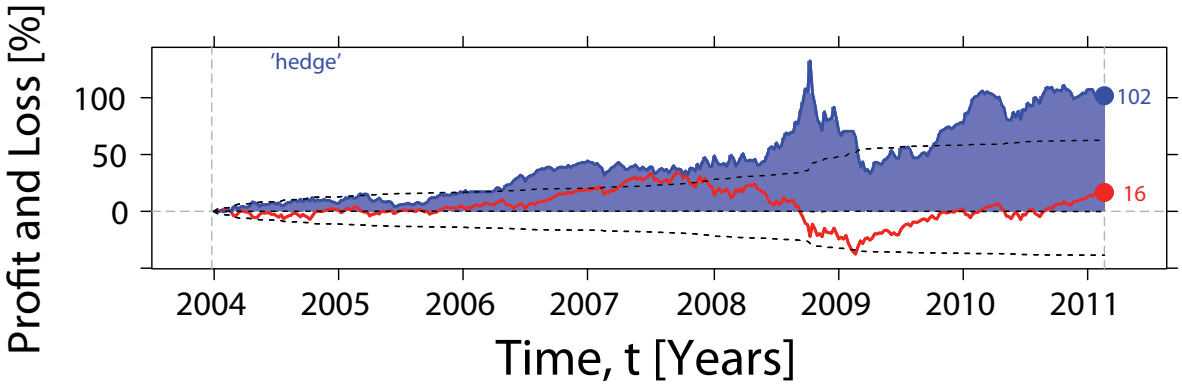

Figure S48. Profit and loss for an investment strategy based on the volume of the search term *hedge* with $\Delta t = 3$ weeks.

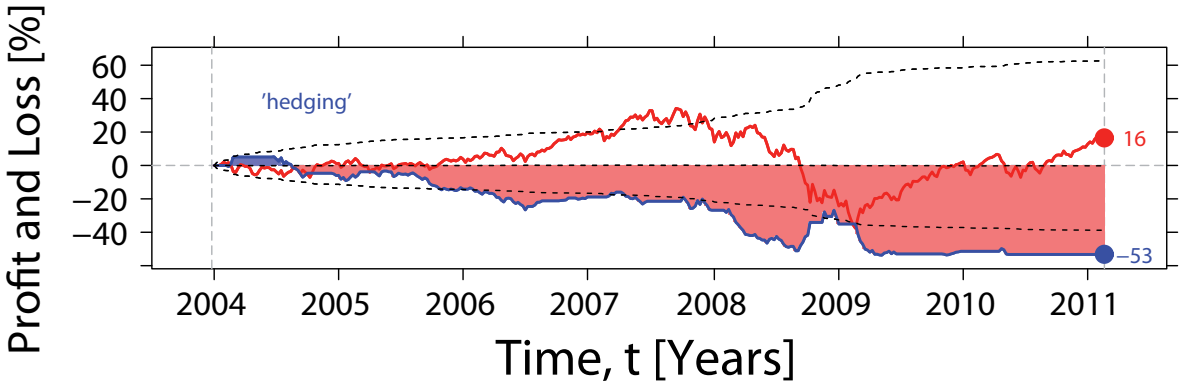

Figure S49. Profit and loss for an investment strategy based on the volume of the search term *hedging* with $\Delta t = 3$ weeks.

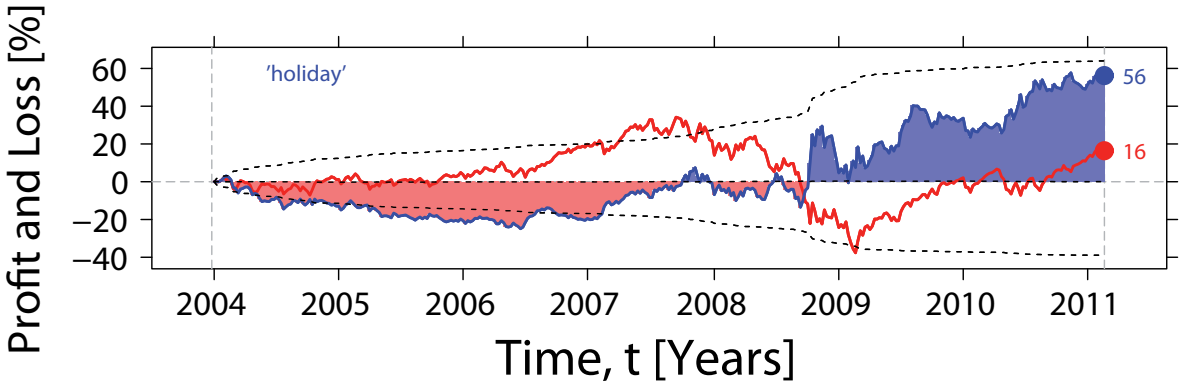

Figure S50. Profit and loss for an investment strategy based on the volume of the search term *holiday* with $\Delta t = 3$ weeks.

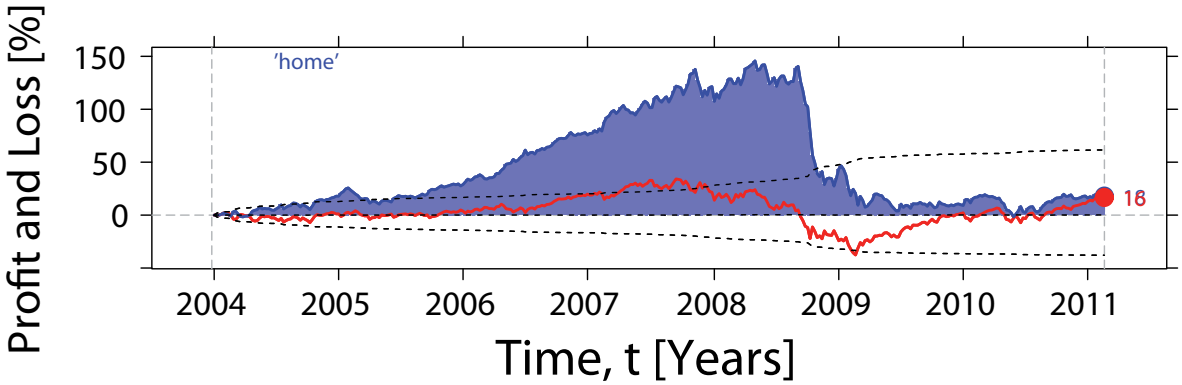

Figure S51. Profit and loss for an investment strategy based on the volume of the search term *home* with $\Delta t = 3$ weeks.

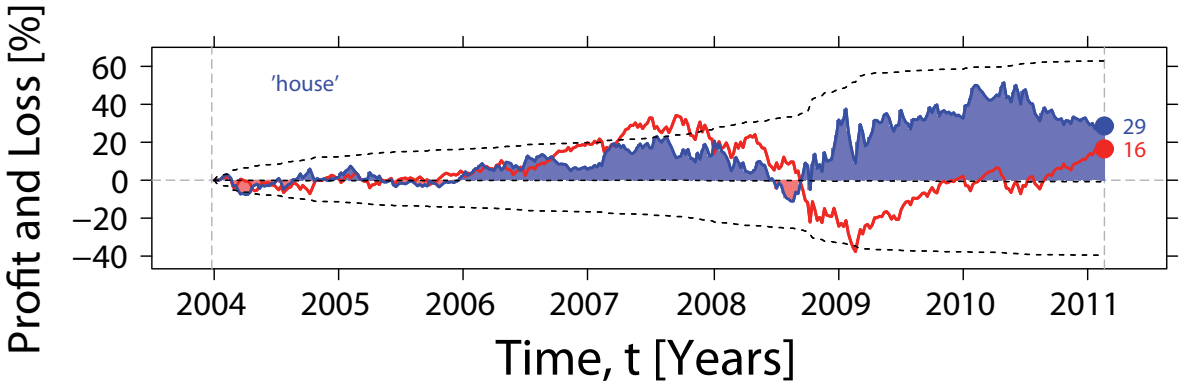

Figure S52. Profit and loss for an investment strategy based on the volume of the search term *house* with $\Delta t = 3$ weeks.

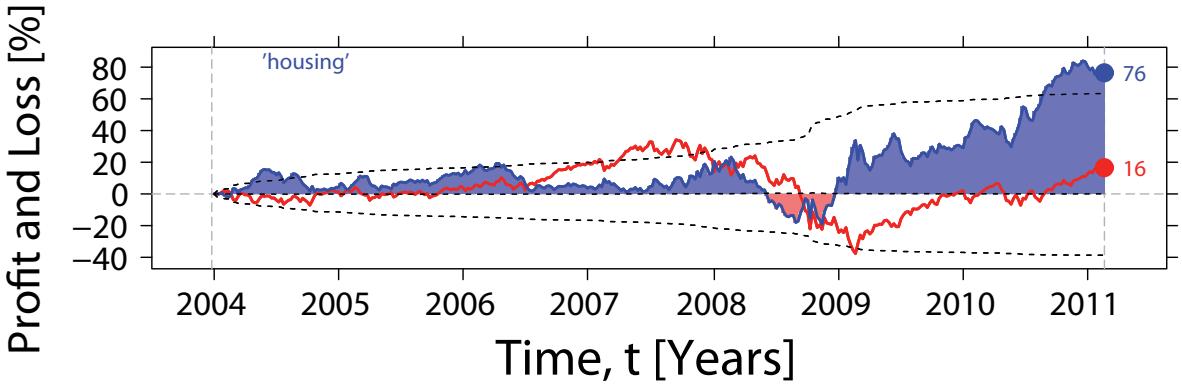

Figure S53. Profit and loss for an investment strategy based on the volume of the search term *housing* with $\Delta t = 3$ weeks.

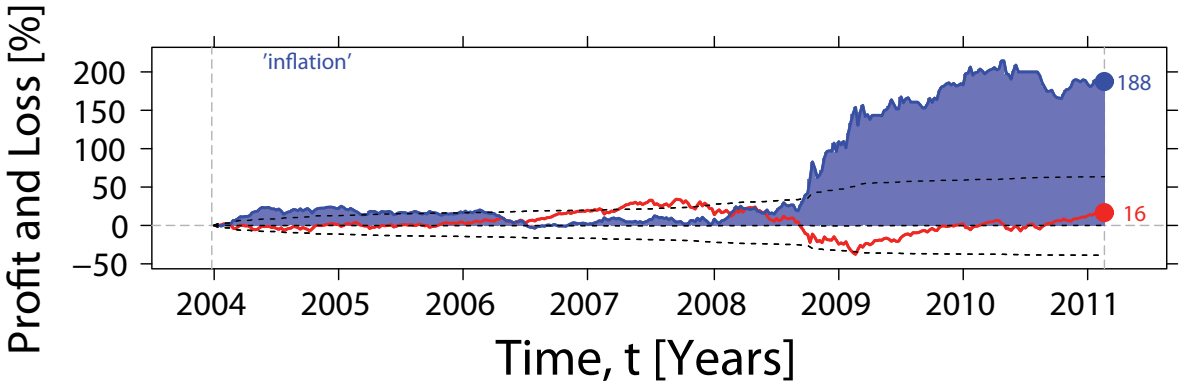

Figure S54. Profit and loss for an investment strategy based on the volume of the search term *inflation* with $\Delta t = 3$ weeks.

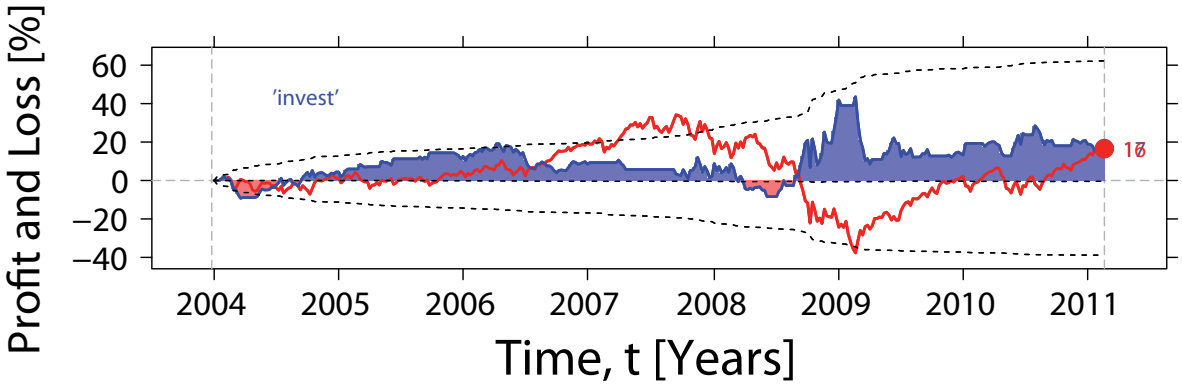

Figure S55. Profit and loss for an investment strategy based on the volume of the search term *invest* with $\Delta t = 3$ weeks.

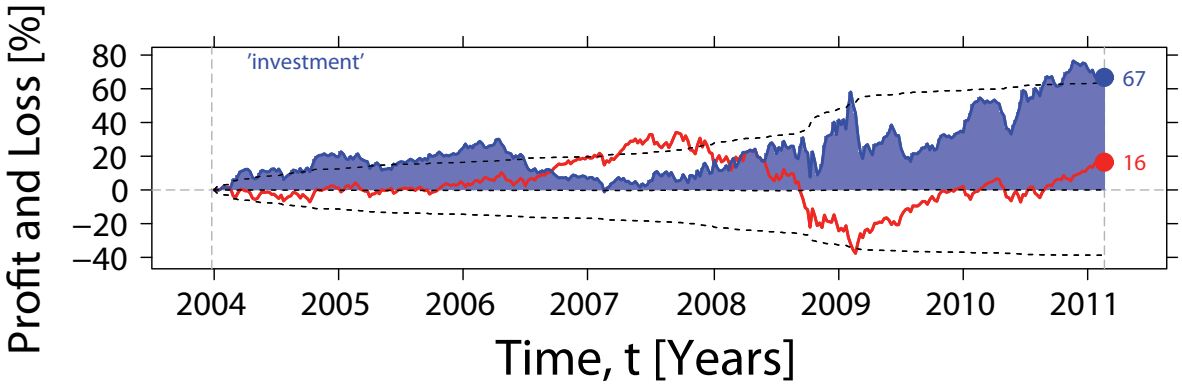

Figure S56. Profit and loss for an investment strategy based on the volume of the search term *investment* with $\Delta t = 3$ weeks.

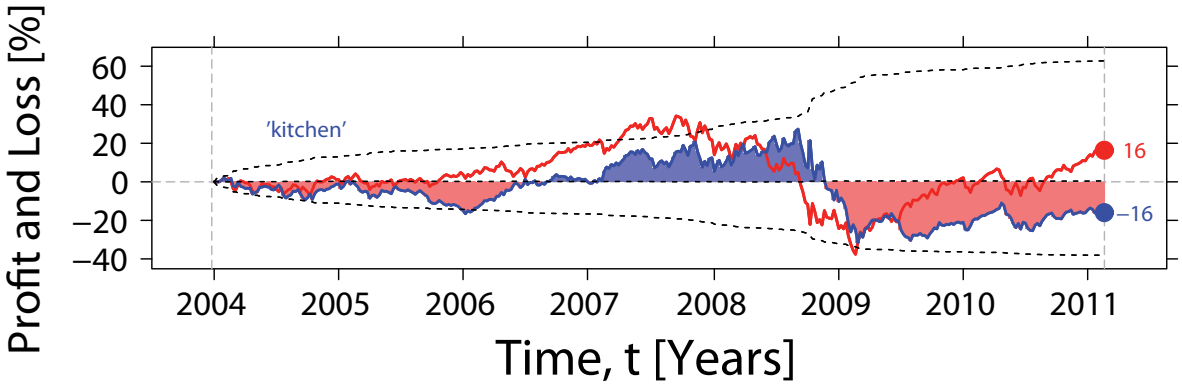

Figure S57. Profit and loss for an investment strategy based on the volume of the search term *kitchen* with $\Delta t = 3$ weeks.

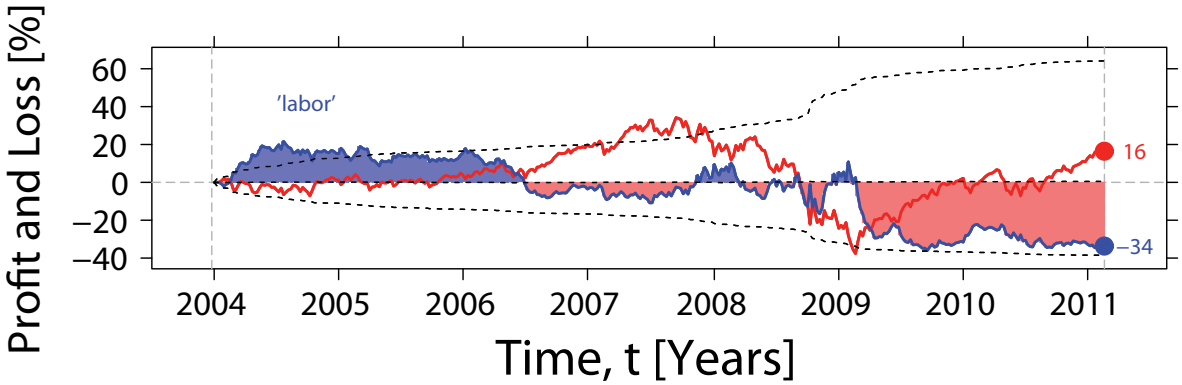

Figure S58. Profit and loss for an investment strategy based on the volume of the search term *labor* with $\Delta t = 3$ weeks.

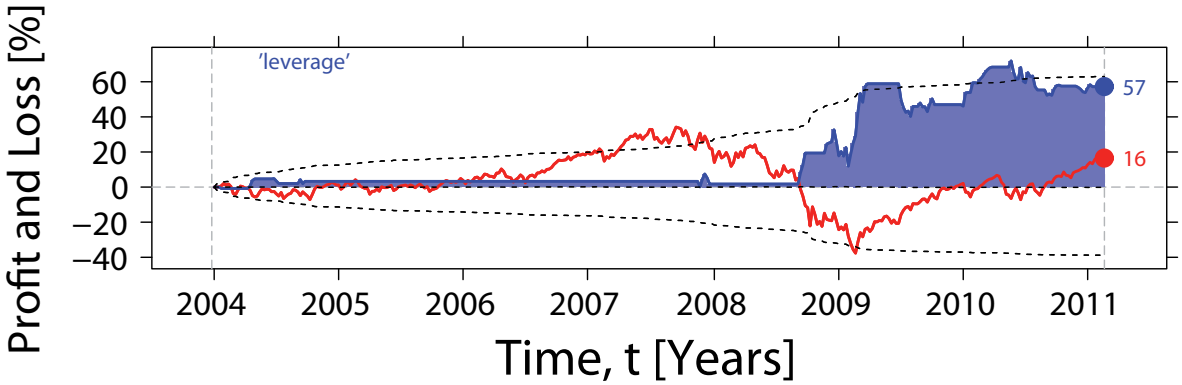

Figure S59. Profit and loss for an investment strategy based on the volume of the search term *leverage* with $\Delta t = 3$ weeks.

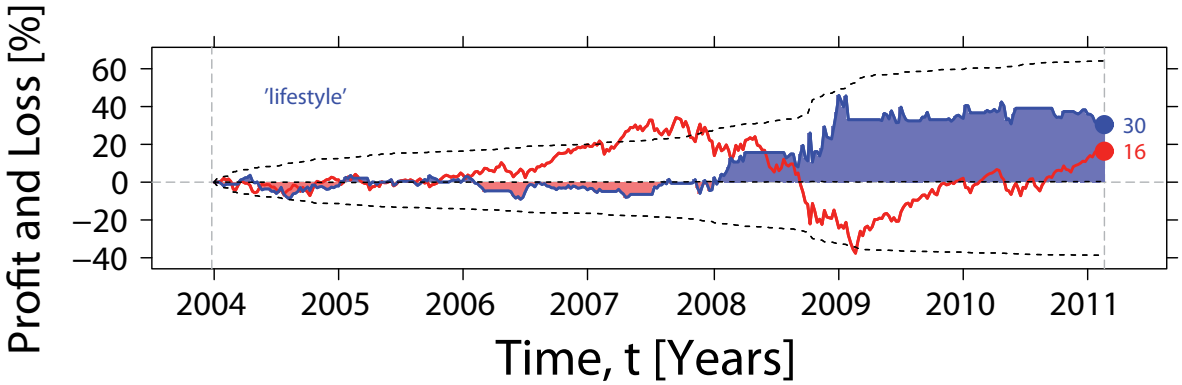

Figure S60. Profit and loss for an investment strategy based on the volume of the search term *lifestyle* with $\Delta t = 3$ weeks.

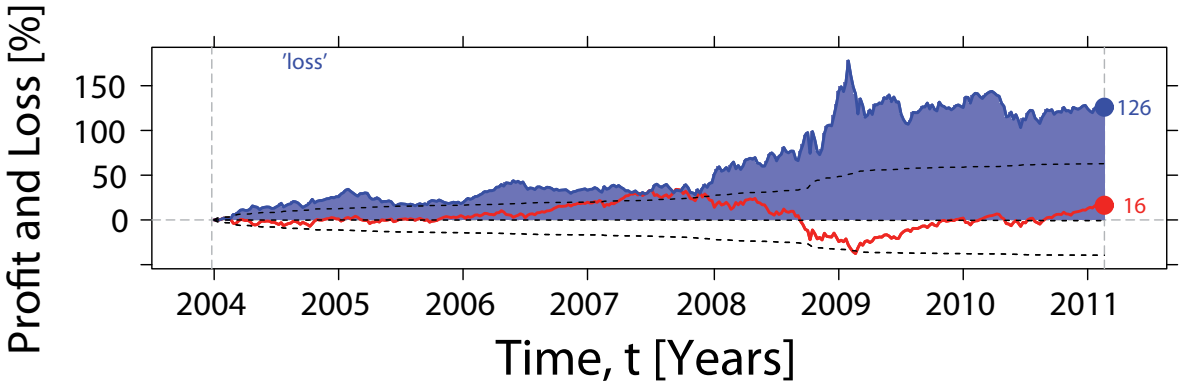

Figure S61. Profit and loss for an investment strategy based on the volume of the search term *loss* with $\Delta t = 3$ weeks.

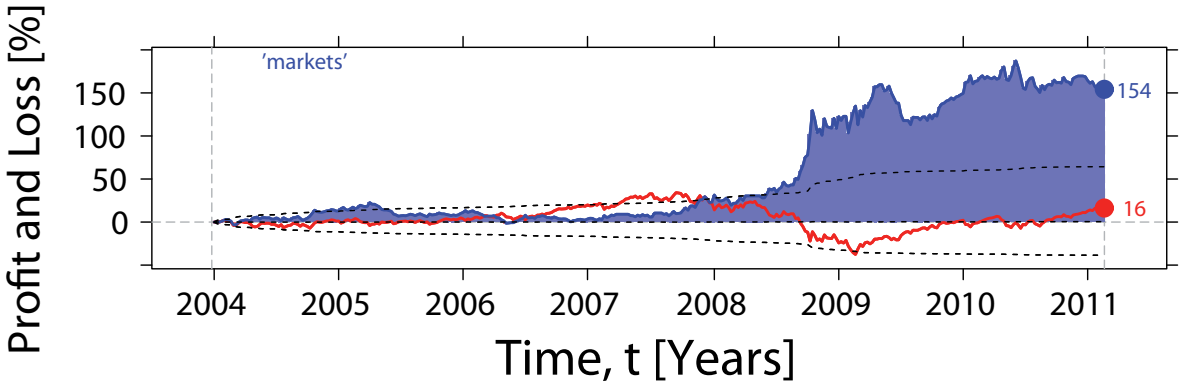

Figure S62. Profit and loss for an investment strategy based on the volume of the search term *markets* with $\Delta t = 3$ weeks.

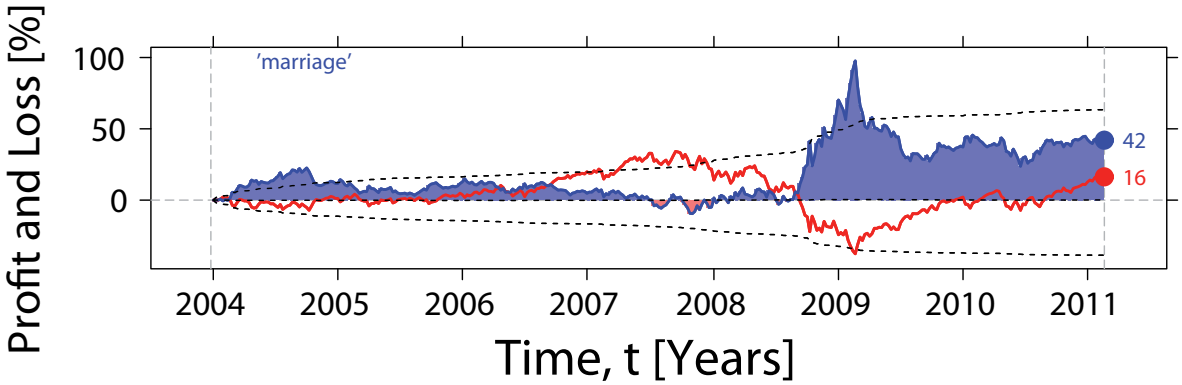

Figure S63. Profit and loss for an investment strategy based on the volume of the search term *marriage* with $\Delta t = 3$ weeks.

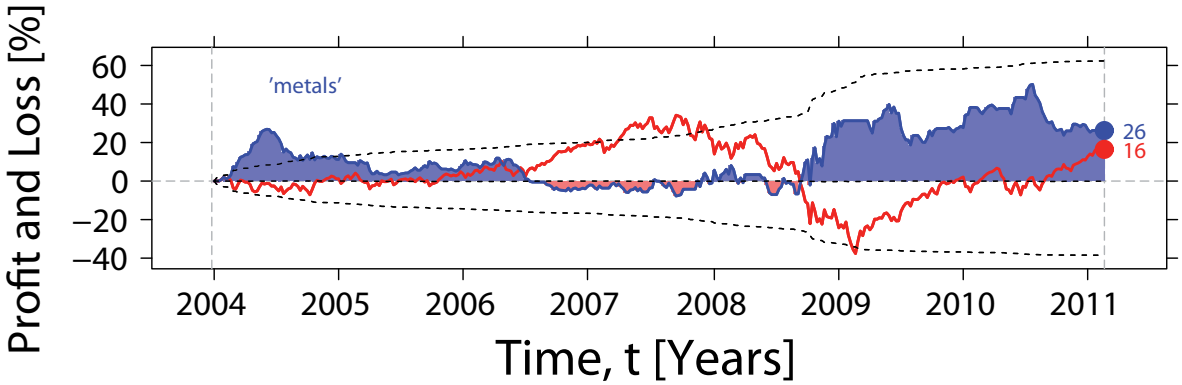

Figure S64. Profit and loss for an investment strategy based on the volume of the search term *metals* with $\Delta t = 3$ weeks.

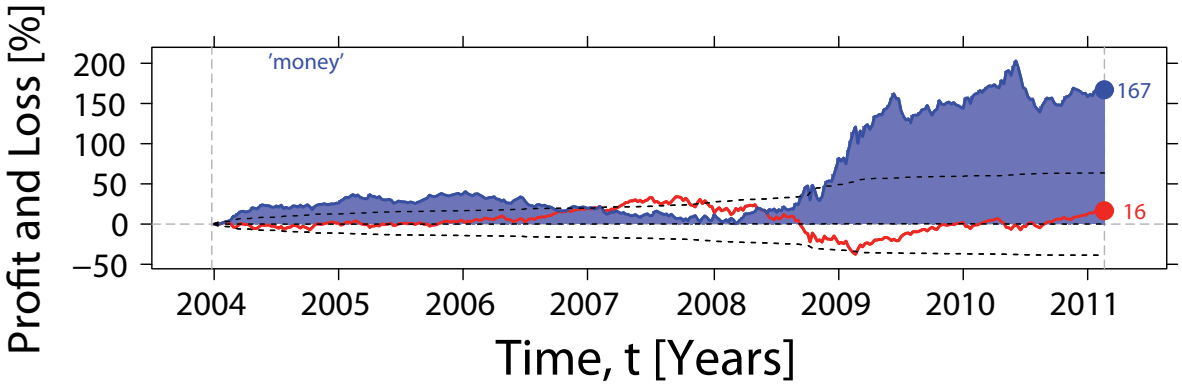

Figure S65. Profit and loss for an investment strategy based on the volume of the search term *money* with $\Delta t = 3$ weeks.

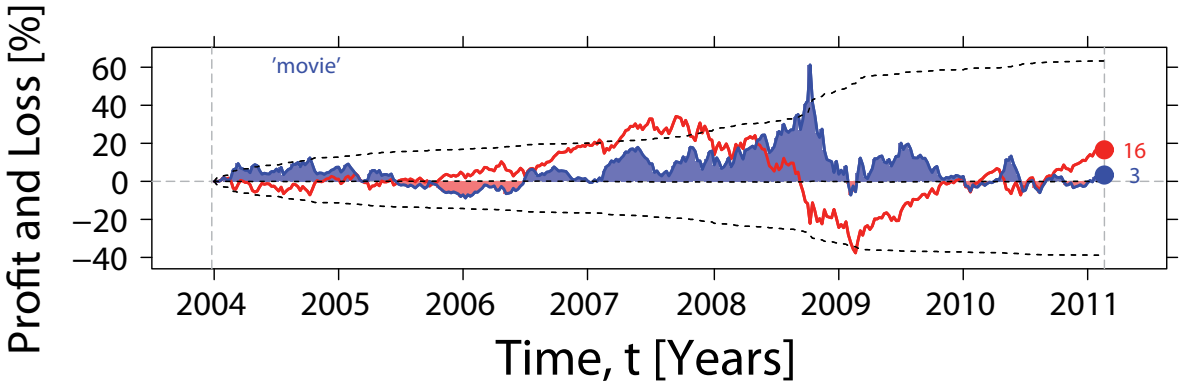

Figure S66. Profit and loss for an investment strategy based on the volume of the search term *movie* with $\Delta t = 3$ weeks.

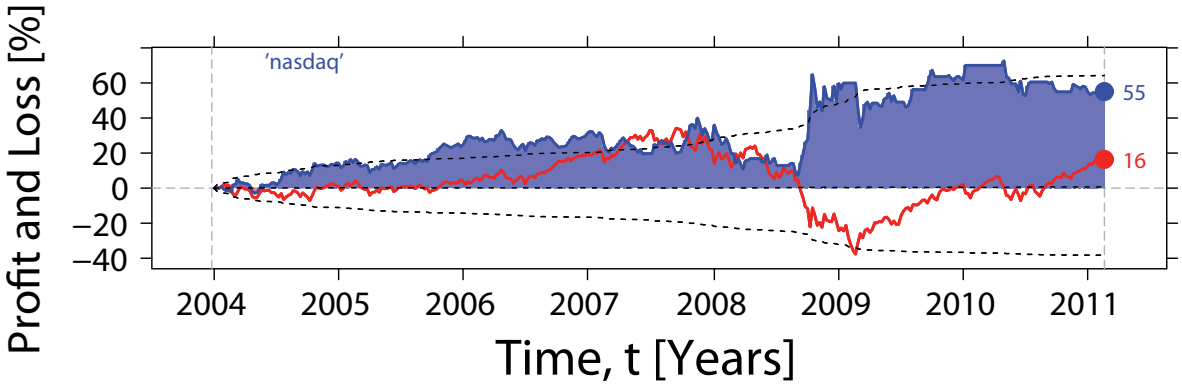

Figure S67. Profit and loss for an investment strategy based on the volume of the search term *nasdaq* with $\Delta t = 3$ weeks.

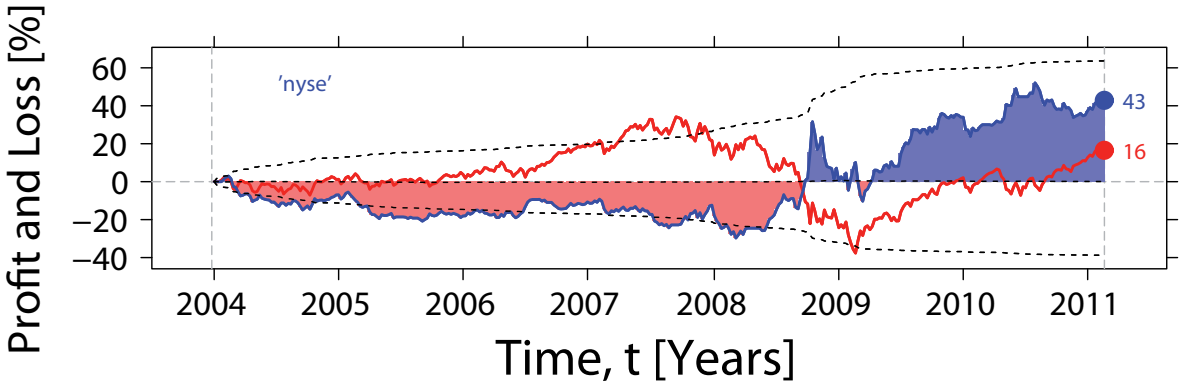

Figure S68. Profit and loss for an investment strategy based on the volume of the search term *nyse* with $\Delta t = 3$ weeks.

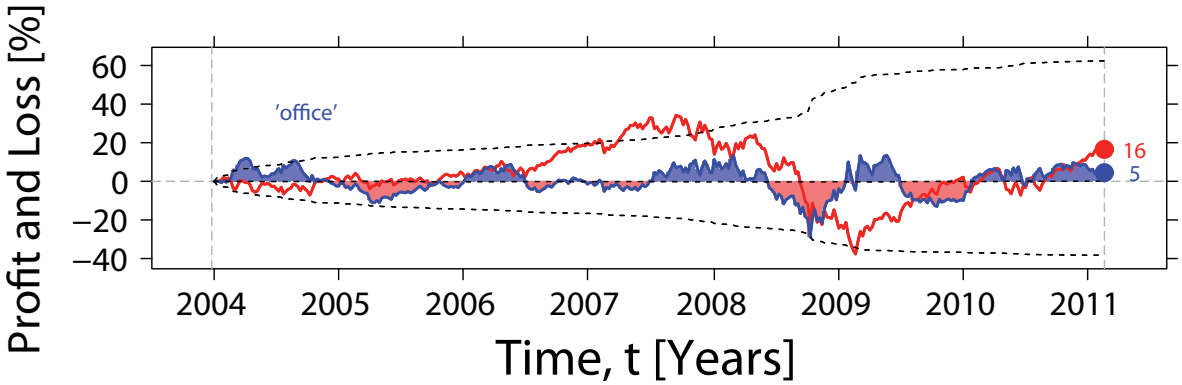

Figure S69. Profit and loss for an investment strategy based on the volume of the search term *office* with $\Delta t = 3$ weeks.

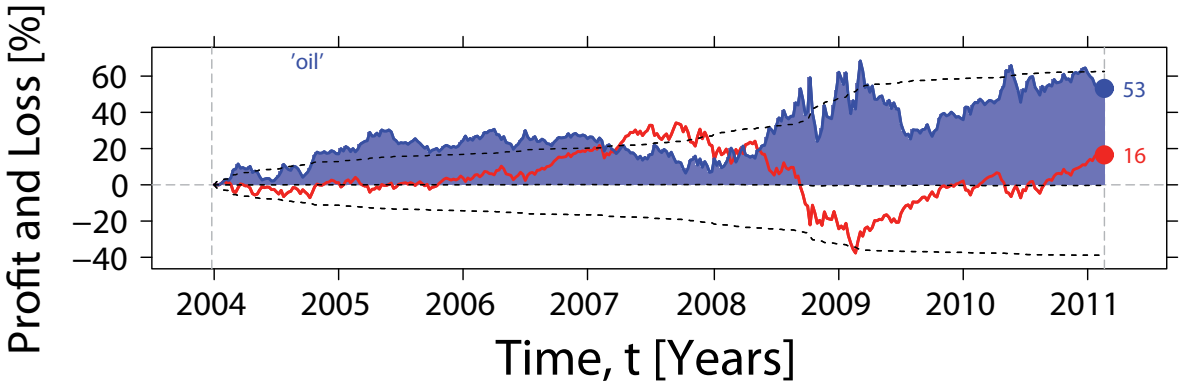

Figure S70. Profit and loss for an investment strategy based on the volume of the search term *oil* with $\Delta t = 3$ weeks.

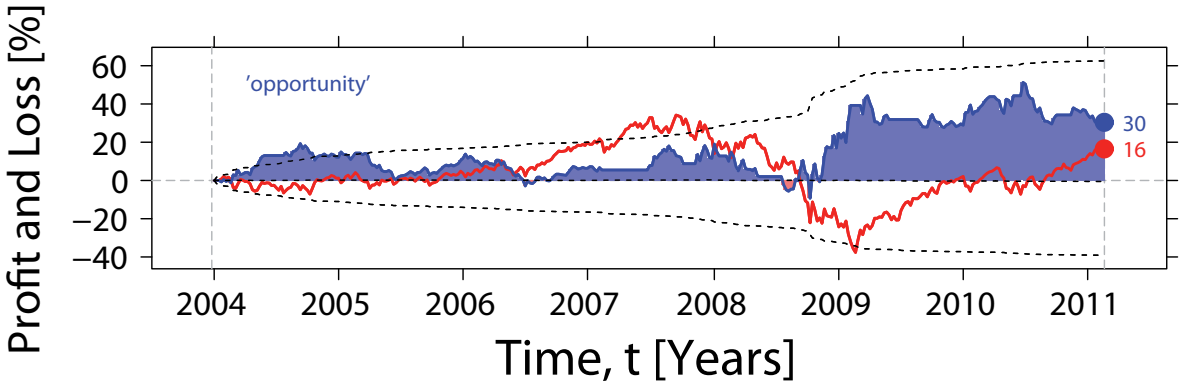

Figure S71. Profit and loss for an investment strategy based on the volume of the search term *opportunity* with Δt = 3 weeks.

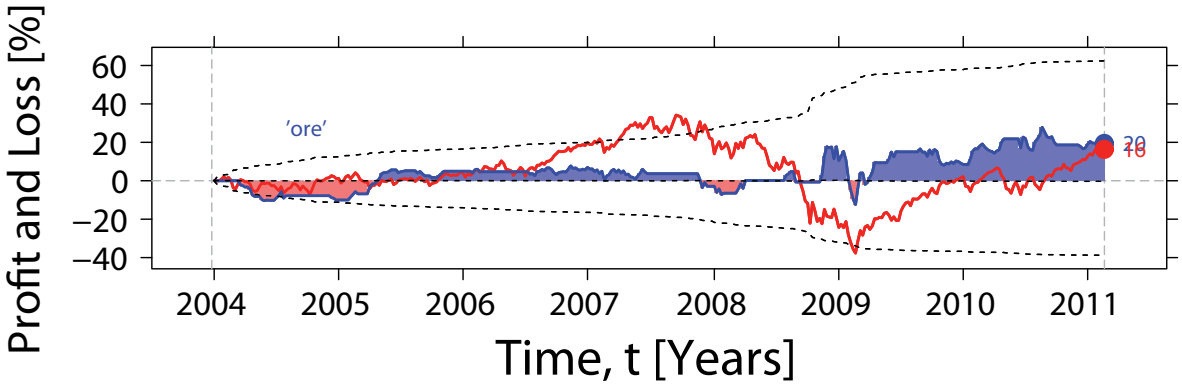

Figure S72. Profit and loss for an investment strategy based on the volume of the search term *ore* with Δt = 3 weeks.

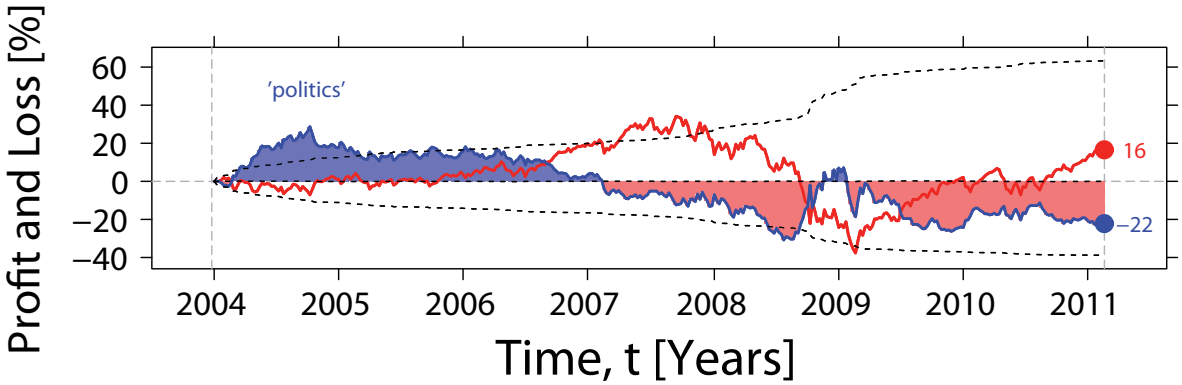

Figure S73. Profit and loss for an investment strategy based on the volume of the search term *politics* with $\Delta t = 3$ weeks.

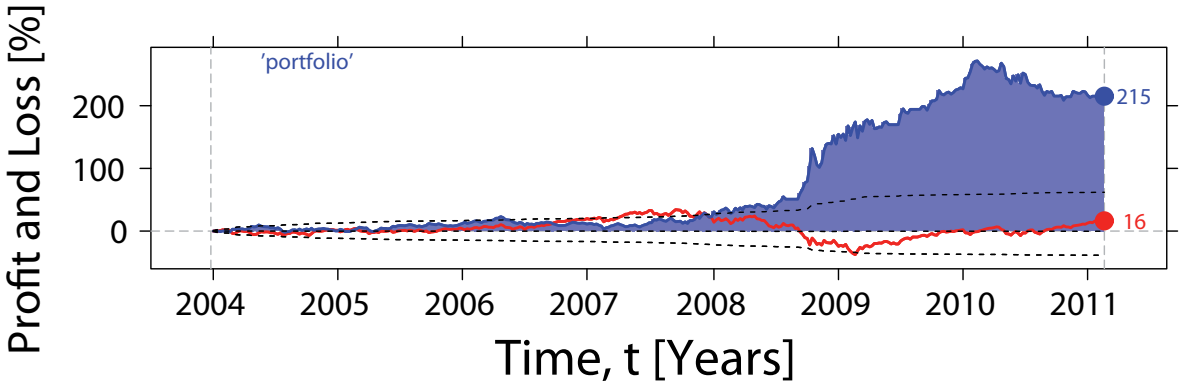

Figure S74. Profit and loss for an investment strategy based on the volume of the search term *portfolio* with $\Delta t = 3$ weeks.

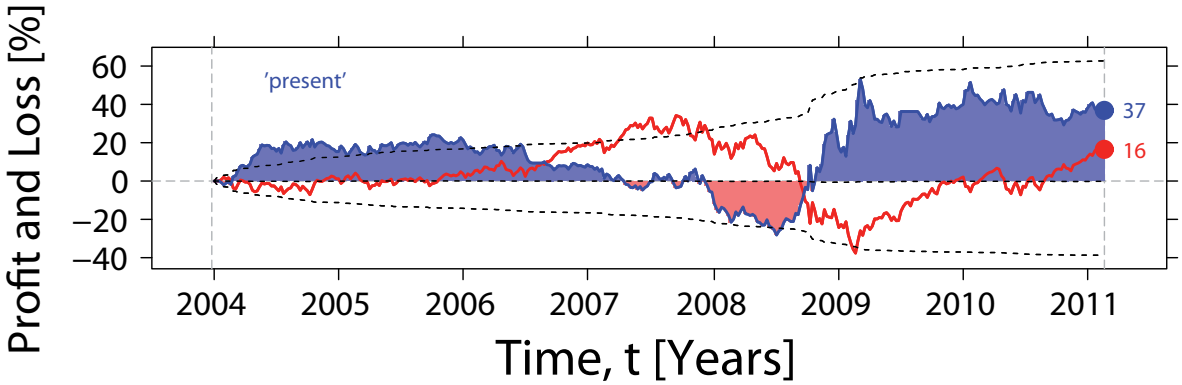

Figure S75. Profit and loss for an investment strategy based on the volume of the search term *present* with Δt = 3 weeks.

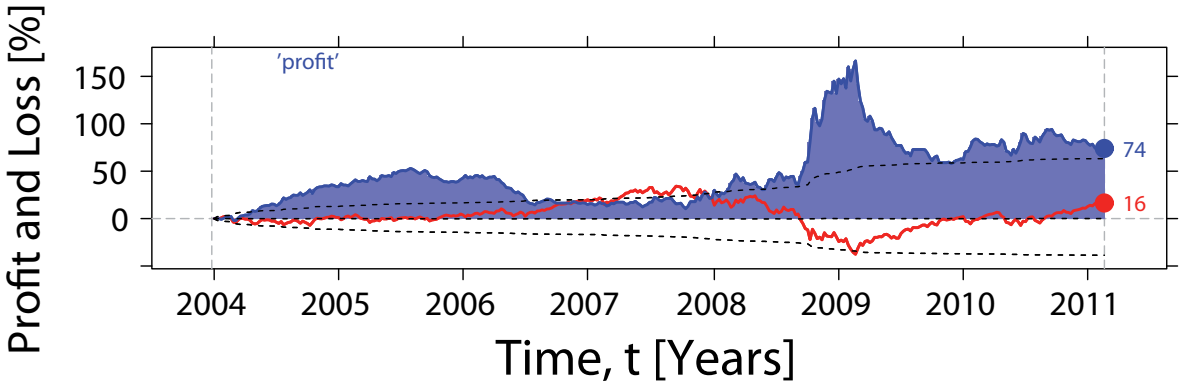

Figure S76. Profit and loss for an investment strategy based on the volume of the search term *profit* with Δt = 3 weeks.

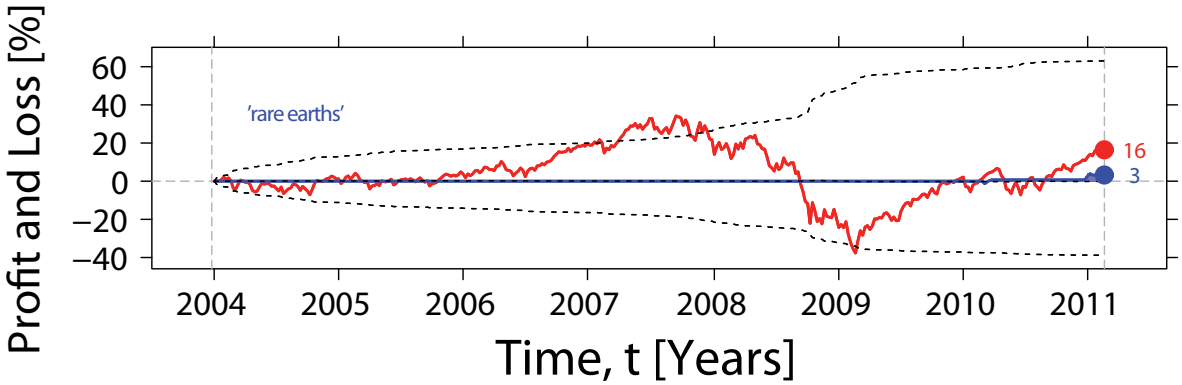

Figure S77. Profit and loss for an investment strategy based on the volume of the search term *rare earths* with $\Delta t = 3$ weeks.

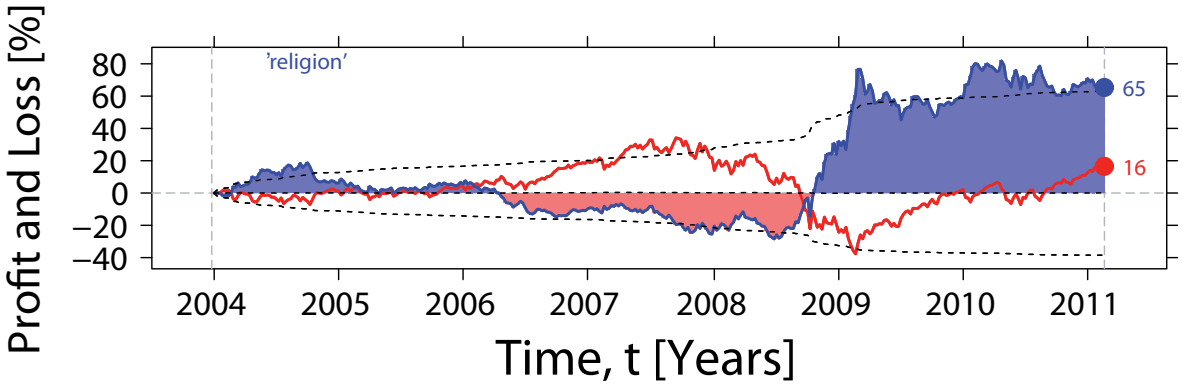

Figure S78. Profit and loss for an investment strategy based on the volume of the search term *religion* with $\Delta t = 3$ weeks.

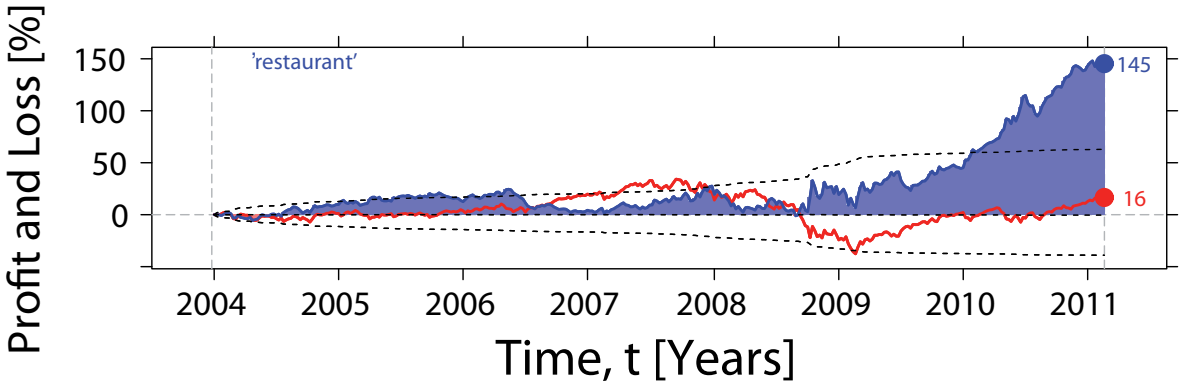

Figure S79. Profit and loss for an investment strategy based on the volume of the search term *restaurant* with $\Delta t = 3$ weeks.

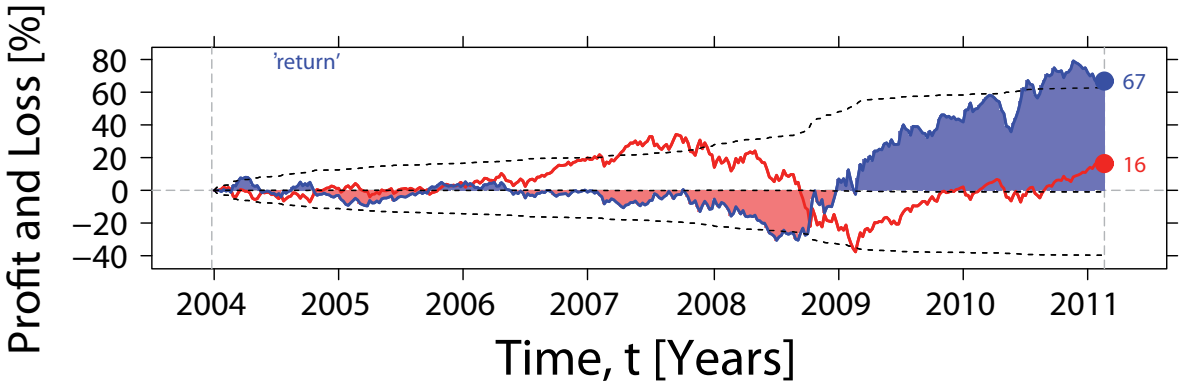

Figure S80. Profit and loss for an investment strategy based on the volume of the search term *return* with $\Delta t = 3$ weeks.

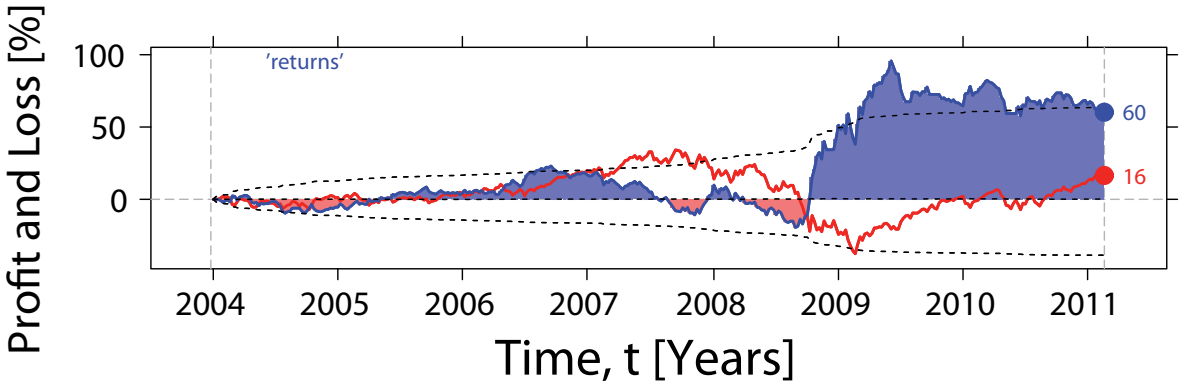

Figure S81. Profit and loss for an investment strategy based on the volume of the search term *returns* with $\Delta t = 3$ weeks.

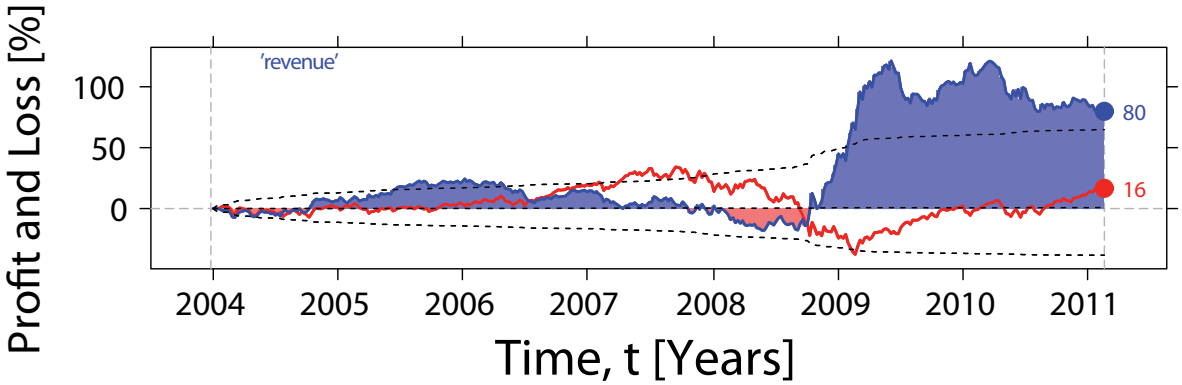

Figure S82. Profit and loss for an investment strategy based on the volume of the search term *revenue* with $\Delta t = 3$ weeks.

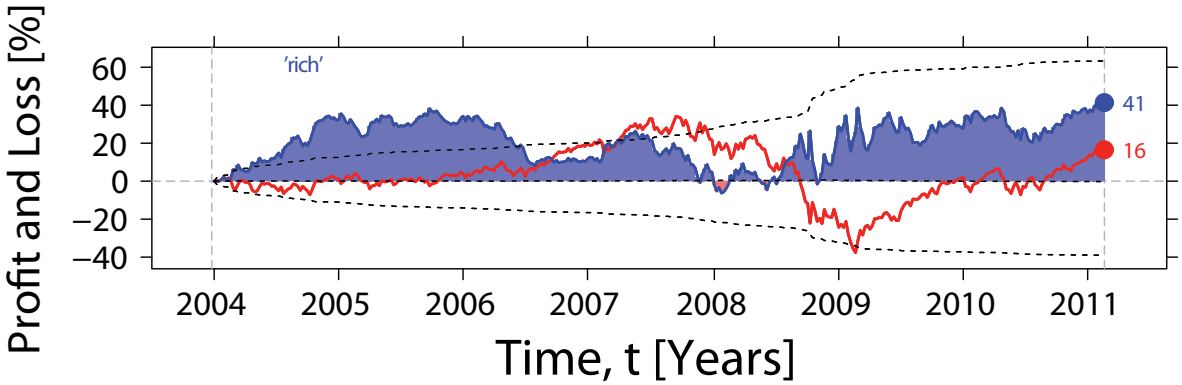

Figure S83. Profit and loss for an investment strategy based on the volume of the search term *rich* with $\Delta t = 3$ weeks.

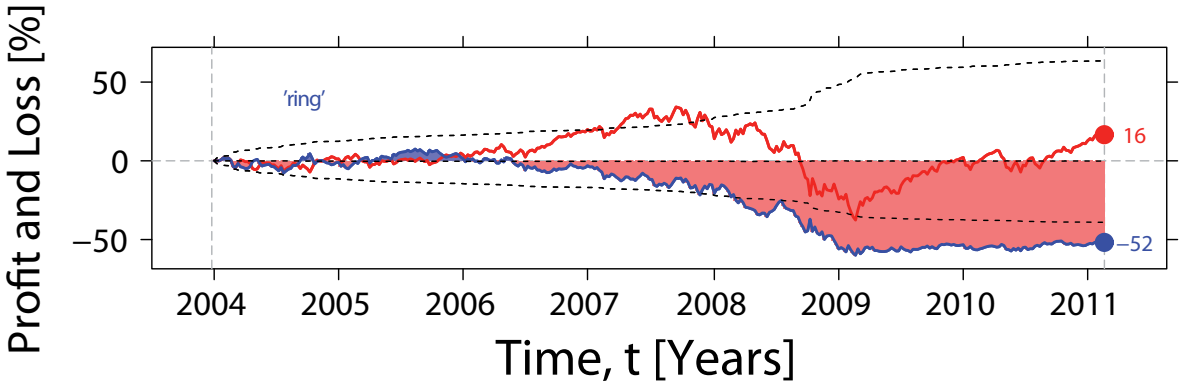

Figure S84. Profit and loss for an investment strategy based on the volume of the search term *ring* with $\Delta t = 3$ weeks.

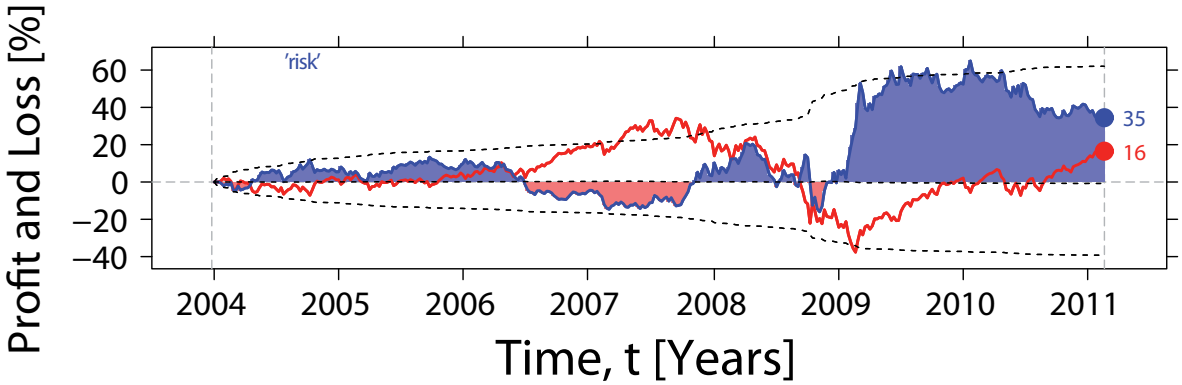

Figure S85. Profit and loss for an investment strategy based on the volume of the search term *risk* with $\Delta t = 3$ weeks.

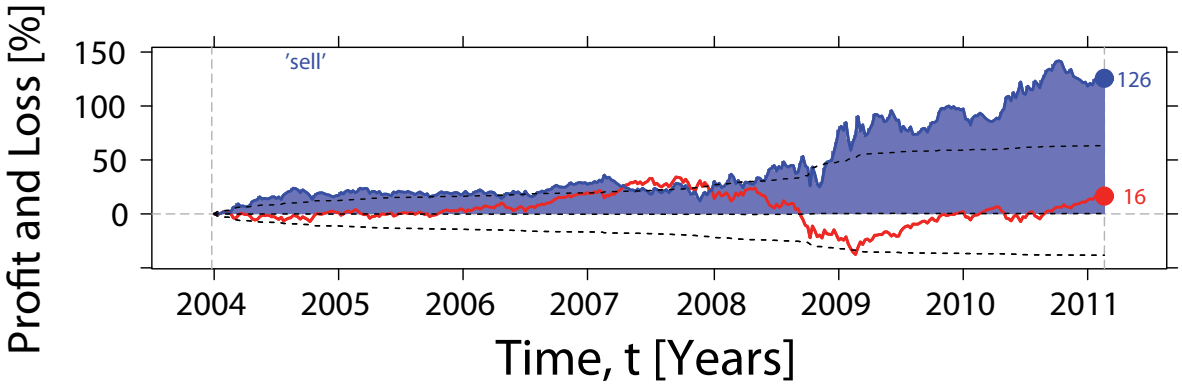

Figure S86. Profit and loss for an investment strategy based on the volume of the search term *sell* with $\Delta t = 3$ weeks.

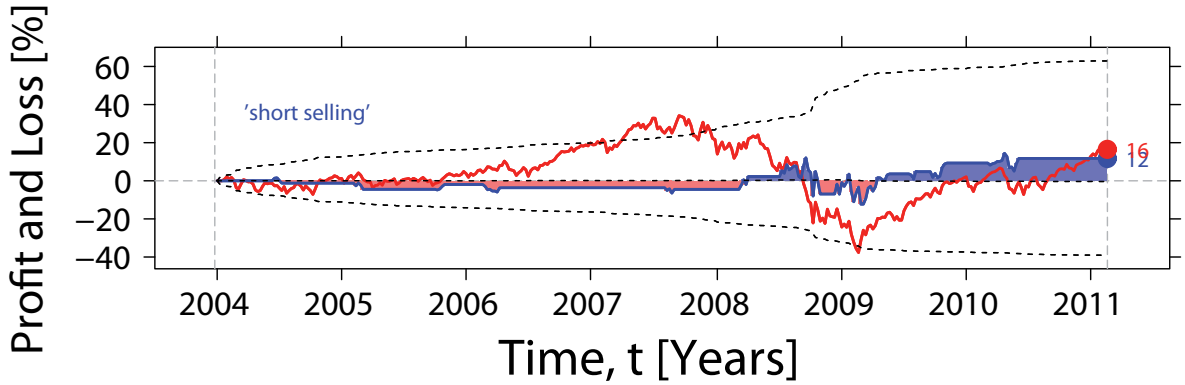

Figure S87. Profit and loss for an investment strategy based on the volume of the search term *short selling* with $\Delta t = 3$ weeks.

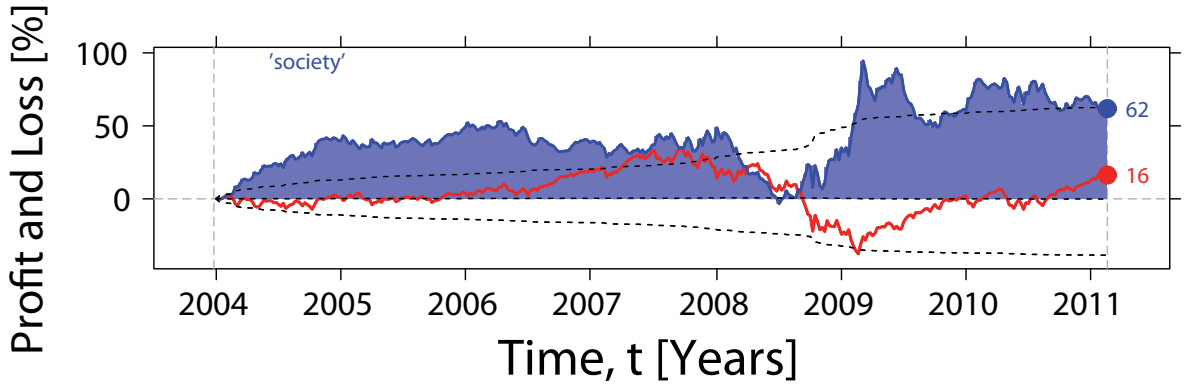

Figure S88. Profit and loss for an investment strategy based on the volume of the search term *society* with $\Delta t = 3$ weeks.

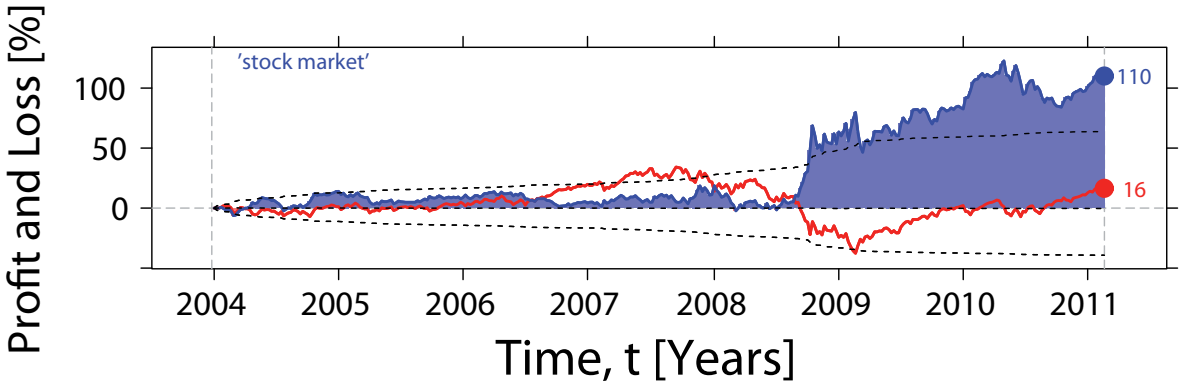

Figure S89. Profit and loss for an investment strategy based on the volume of the search term *stock market* with $\Delta t = 3$ weeks.

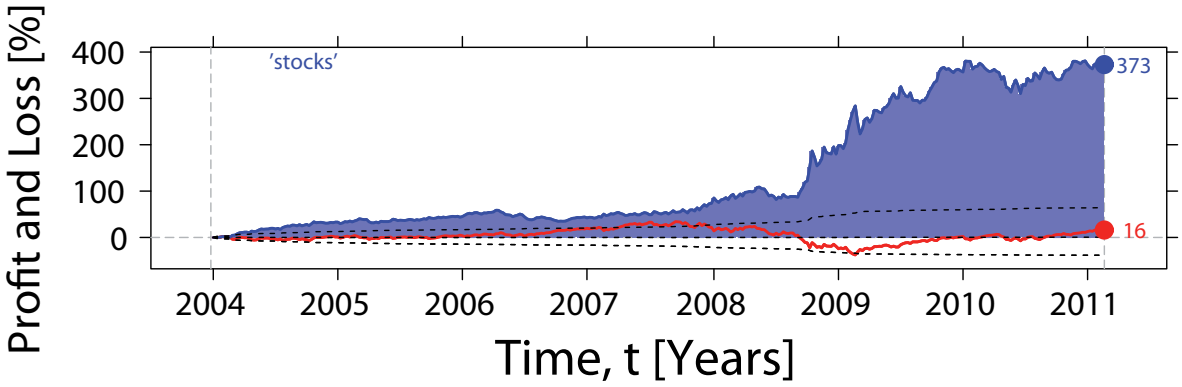

Figure S90. Profit and loss for an investment strategy based on the volume of the search term *stocks* with $\Delta t = 3$ weeks.

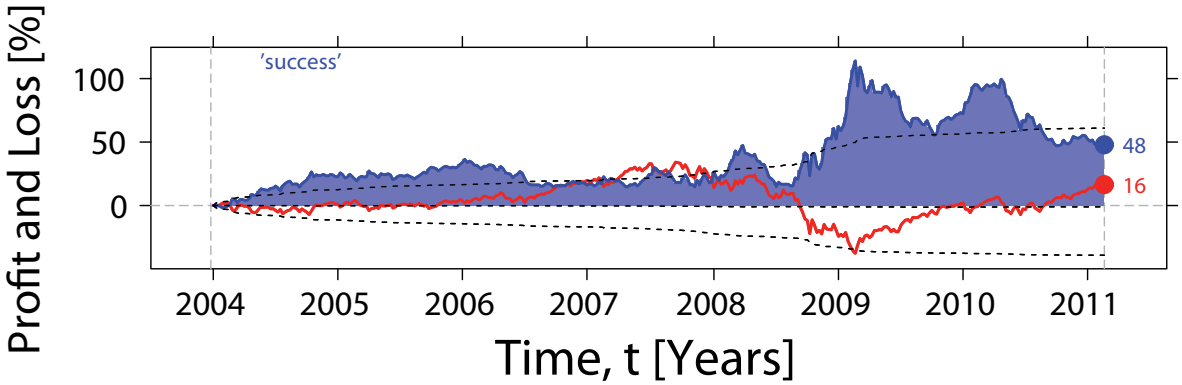

Figure S91. Profit and loss for an investment strategy based on the volume of the search term *success* with $\Delta t = 3$ weeks.

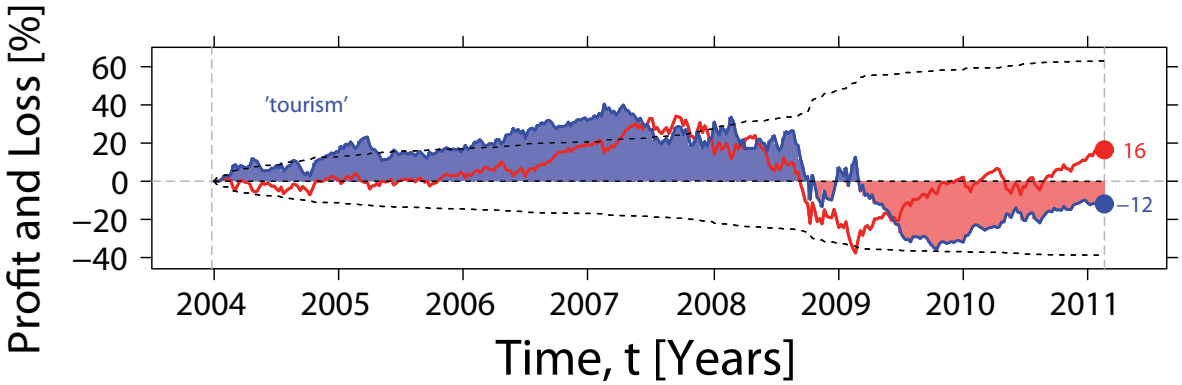

Figure S92. Profit and loss for an investment strategy based on the volume of the search term *tourism* with $\Delta t = 3$ weeks.

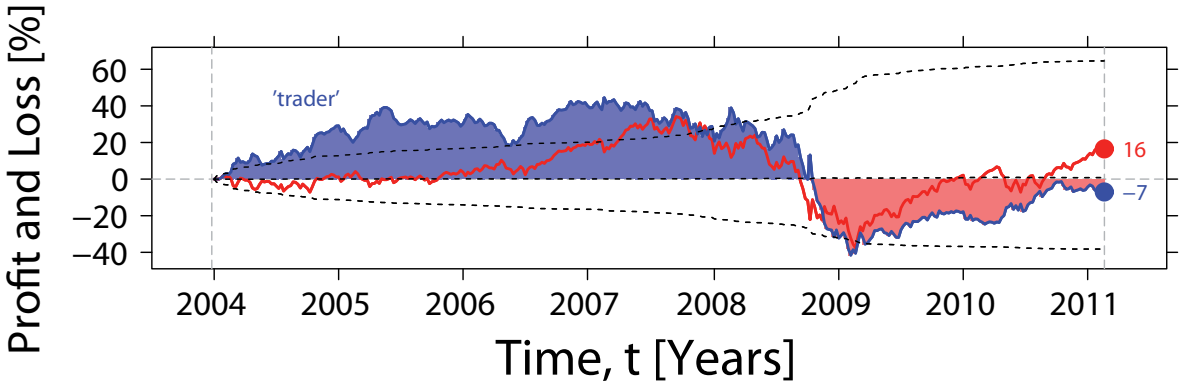

Figure S93. Profit and loss for an investment strategy based on the volume of the search term *trader* with $\Delta t = 3$ weeks.

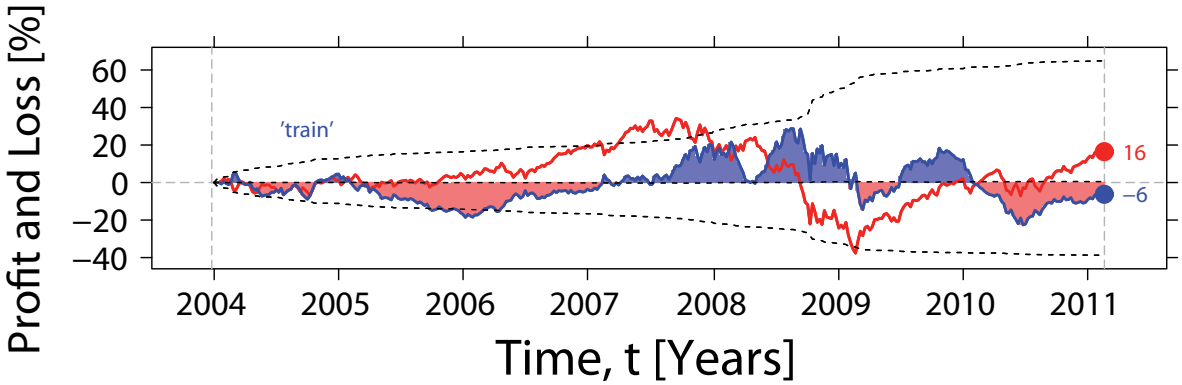

Figure S94. Profit and loss for an investment strategy based on the volume of the search term *train* with $\Delta t = 3$ weeks.

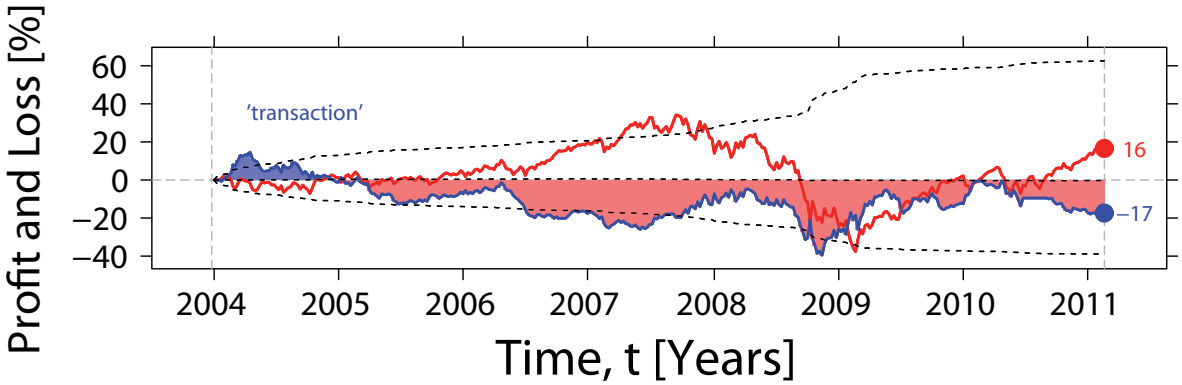

Figure S95. Profit and loss for an investment strategy based on the volume of the search term *transaction* with $\Delta t = 3$ weeks.

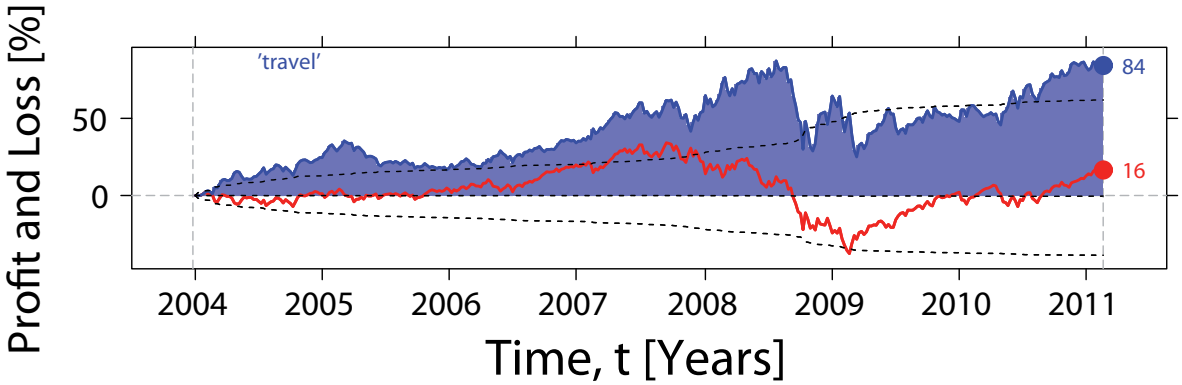

Figure S96. Profit and loss for an investment strategy based on the volume of the search term *travel* with $\Delta t = 3$ weeks.

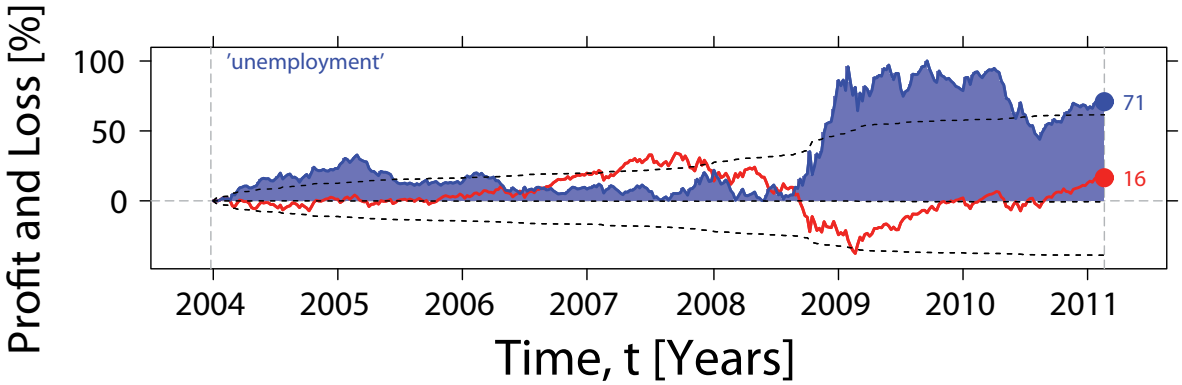

Figure S97. Profit and loss for an investment strategy based on the volume of the search term *unemployment* with $\Delta t = 3$ weeks.

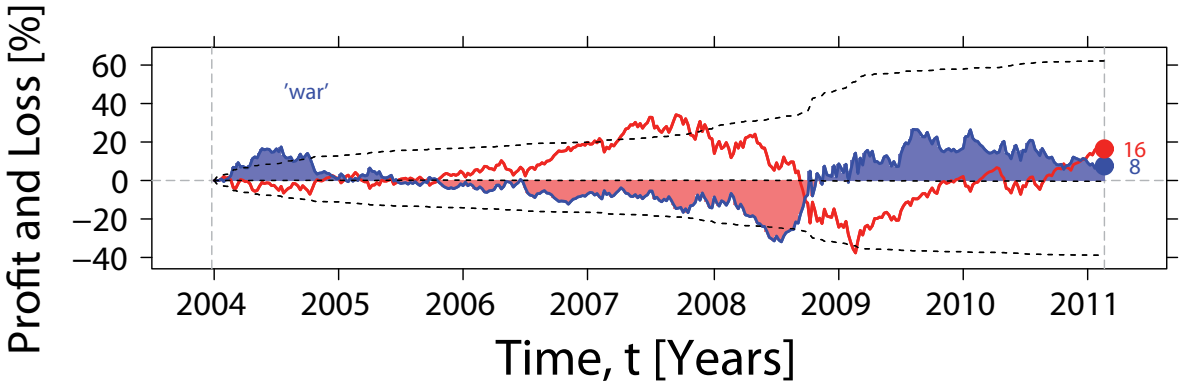

Figure S98. Profit and loss for an investment strategy based on the volume of the search term *war* with $\Delta t = 3$ weeks.

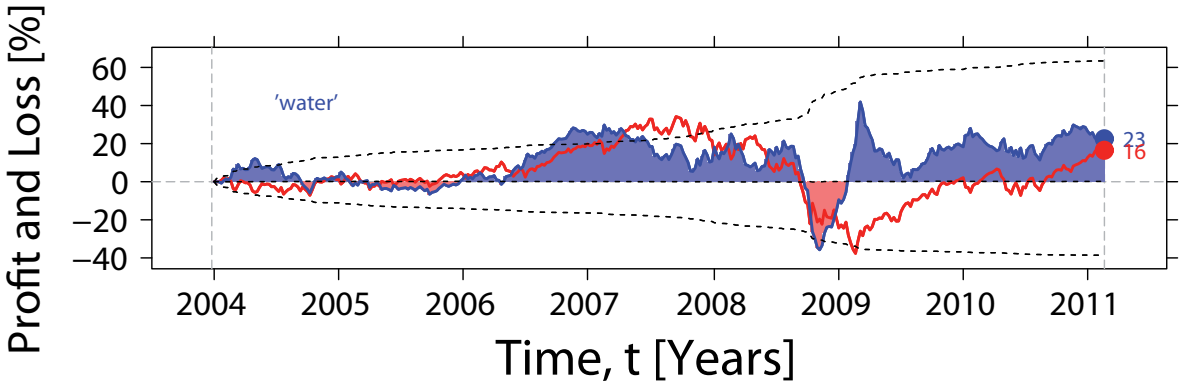

Figure S99. Profit and loss for an investment strategy based on the volume of the search term *water* with $\Delta t = 3$ weeks.

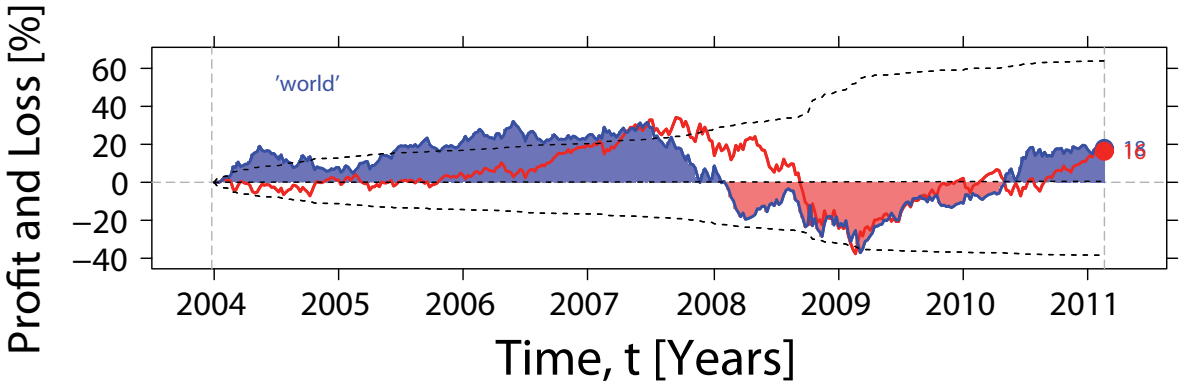

Figure S100. Profit and loss for an investment strategy based on the volume of the search term *world* with $\Delta t = 3$ weeks.

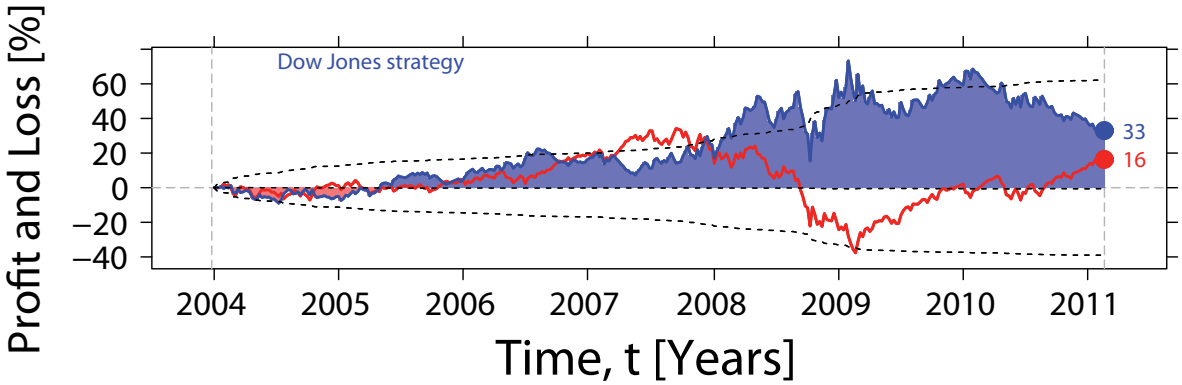

Figure S101. Profit and loss for the Dow Jones strategy, using changes in *p(t)* in place of changes in search volume data as the basis of buy and sell decisions, with $\Delta t = 3$ weeks.