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FACULTY OF ARTS & SCIENCES
Department of Economics

LABOR AND EQUITY LAB

Lebanon Pulse Index Simulation

Technical Report

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Lebanon Pulse Index Simulation

A Comparative Analysis of Alternative Economic Sentiment Methodologies

Noura El Awar

Leila El Sayed

Layan Keaik

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Abstract

The Lebanon Pulse Index is the Labor and Equity Lab at the American University of Beirut's measure of consumer confidence and economic sentiment in Lebanon. Ahead of its construction, this paper uses pilot data from 182 respondents to examine established economic-sentiment methodologies for design choices that could inform the index. We benchmark four such methodologies, from the United States, Germany, Japan, and India, against the same seventeen-item question set, examine the underlying structure of the six core and eleven standby items through principal component analysis, and assess how sensitive each methodology's composite score is to the addition of individual standby items.

The core six items behave as a single, coherent construct, supporting simple equal-weighted averaging. Within that construct, the three present-oriented and three future-oriented items separate cleanly into two related but distinct components, providing empirical support for building the Lebanon Pulse Index as separate present and future sub-indices rather than one undifferentiated score. The sensitivity analysis further shows that progressive-weighting methodology, which retains the intensity of a response rather than collapsing it into a binary positive or negative category, is more responsive to the concentration of extreme responses present in the pilot data. We recommend that the production Lebanon Pulse Index draw on progressive weighting, combined with a present and future sub-index structure grounded in the six core items, rather than adopting any single benchmarked methodology wholesale.

1. Introduction

The Lebanon Pulse Survey (LPS), described in full in the Technical Documentation (Labor and Equity Lab, 2026), is intended to track confidence and general economic sentiment over time in Lebanon. Before the construction of the Lebanon Pulse Index (LPI) is finalized, this paper uses the LPS pilot data to address three design questions: how alternative methodologies perform when applied to the LPS questionnaire, whether the core and standby items capture the same underlying construct, and how sensitive the resulting index is to the inclusion of individual questions.

We proceed in three steps. First, we benchmark four national economic-sentiment methodologies, the United States Consumer Confidence Index, Germany's Konsumklima, Japan's Economy Watchers Diffusion Index, and India's Consumer Confidence Survey, chosen because each treats survey responses differently when converting them into a score. Second, we use principal component analysis (PCA) to examine whether the pilot's core and standby items behave as a single underlying construct or several. Third, we test the sensitivity of each methodology's composite score to the addition of individual standby items, which allows us to separate effects arising from the choice of methodology from effects arising from the choice of questions. Together, these three analyses inform the design of the LPI and the choice of questions and weighting approach.

2. Data and Instrument

This paper uses data from the LPS pilot survey, conducted by phone in February 2026 (n = 182). The sample is broadly balanced by gender, with 51% of respondents female and 49% male. Respondents come from across Lebanon. By residence type, 38% live in a small city, 34% in a major city, 27% in a town or village, and 3 respondents live in a camp or informal settlement.

Additionally, 82% of respondents are Lebanese. The main other nationalities include Palestinian (3%) and Syrian (15%). Respondents varied in their levels of education, 27% having completed primary education, 23% having completed secondary education, 7% holding a vocational degree, 25% holding an undergraduate degree, 9% holding a graduate degree, and 9% reporting no formal education. Respondents' employment status also varied, with 26%

employed full-time, 8% employed part-time, 18% self-employed, 16% unemployed, 5% retired, and 24% homemakers.

The questionnaire is described in the Technical Documentation: Lebanon Pulse Survey. The instrument relevant to this paper consists of a 17-item set comprising six core questions covering present conditions and expectations for the immediate future, and eleven standby questions covering related economic and social concerns.

The pilot uses random-call sampling; the sampling approach intended for the full survey to produce a nationally representative sample. With a sample of 182 respondents, however, subgroup differences cannot be estimated with much precision, and the single wave does not allow us to examine changes over time. These limitations are discussed further in the limitations section. For the purposes of this paper, the pilot provides a useful basis for evaluating the construction of the index. The PCA and sensitivity analysis are used to assess the structure of the questions and how the index responds to different methodological choices and to the addition of questions. They are not used to draw population-level conclusions about economic sentiment in Lebanon.

3. The Lebanon Pulse Index: Comparing Four Alternative Methodologies

We benchmark the LPI against four national consumer-confidence methodologies: the United States Consumer Confidence Index (CCI), produced by the Conference Board, Germany's consumer climate (Konsumklima) study by the Nuremberg Institute for Market Decisions, the Economy Watchers Diffusion Index (DI) based on Japan's Economy Watchers Survey, and India's Consumer Confidence Survey (CCS) produced by the Reserve Bank of India. The four approaches were selected because they differ in how they translate positive, neutral, and negative responses into an index, which allows us to test how sensitive the resulting index is to the choice of design rather than to the choice of questions included.

All four methodologies are implemented as simplified versions of their published approaches and adapted to the response structure of the LPS questionnaire. They are used as methodological benchmarks rather than exact replications of the indices.

The main distinction among the four is how each methodology treats the five response categories. The US CCI and Germany's Konsumklima approaches collapse the two positive categories into a single weight and the two negative categories into another, excluding neutral responses entirely. India's CCS also collapses each direction into a single weight but retains neutral as a genuine zero rather than excluding it. Japan's DI is the only approach that preserves the full five-point scale, assigning progressively different weights to each response category.

Figure 1 shows each methodology's formula, its exact response weighting, its score range, and how that range is interpreted. This distinction is central to the sensitivity analysis that follows. By applying all four approaches to the same LPS responses, we can separate effects arising from the choice of index methodology from those arising from the choice of questions included in the index.

All four methodologies compute a present-oriented sub-index and a future-oriented sub-index: the Present Situation Index (PSI) and Expectations Index (EI) for the United States, the Current Situation Index (CSI) and Future Expectations Index (FEI) for India, and the equivalent present- and future-oriented sub-indices for Germany and Japan.

Within each sub-index, item scores are equally weighted, and the overall composite is calculated as the equal-weighted average of all items included. This means that the two sub-indices have equal weight only when they contain the same number of items, as in the six-item core. If the sensitivity analysis adds one standby item to either the present or the future sub-index, that sub-index will have greater weight in the overall composite because it contains more items.

Figure 1. Summary of the benchmark approaches

United States
Consumer Confidence Index (The Conference Board)

CCI = (PSI + EI) / 2, indexed to 1985 = 100

- Positive and extremely positive both weighted +1
- Negative and extremely negative both weighted −1
- Neutral retained, weighted 0

Score range: Not fixed; rebased to a historical anchor year (1985 = 100)
Interpretation: Above 100 is more optimistic than anchor year and below 100 is less optimistic

Germany
Konsumklima (Net Balance)

Balance = %positive − %negative

- Positive and extremely positive both weighted +1
- Negative and extremely negative both weighted −1
- Neutral retained, weighted 0

Score range: Approximately −100 to +100; not rebased

Interpretation: A score of 0 is an even split, above 0 is net optimism and below 0 is net pessimism

Japan
Economy Watchers Diffusion Index (DI)

DI = Σ(weight × response share) × 100

- Five distinct weights retained
- Extremely negative = 0, negative = 0.25, neutral = 0.5, positive = 0.75, extremely positive = 1

Score range: 0 to 100

Interpretation: A score of 50 is neutral, above 50 is optimistic, and below 50 is pessimistic

India
Consumer Confidence Survey

CSI / FEI = 100 + (%positive − %negative)

- Positive and extremely positive both weighted +1
- Negative and extremely negative both weighted −1
- Neutral responses retained, weighted 0

Score range: Approximately 0 to 200 and centered on 100

Interpretation: A score of 100 is neutral, above 100 is net optimism, and below 100 is net pessimism

Figure 2 lists the seventeen items used in this analysis, their variable codes, whether they ask about present conditions or future expectations, and whether they belong to the six-item core set or the eleven-item standby set tested in the sections that follow.

Figure 2. The Question Bank

Core items (6): feed the LPI present and future sub-indices.

Present	*Future*
Q14. General Economic Situation (last 12 months) In your view, how has the general economic situation in Lebanon changed over the past 12 months?	**Q36. General Economic Outlook (next 12 months)** How do you expect the overall economic situation in Lebanon, including business activity in the country, to develop over the next 12 months?
Q20. Household Financial Situation (last 12 months) Compared to 12 months ago, how has the financial situation of your household changed?	**Q41. Expected Household Financial Situation (next 12 months)** Looking ahead to one year from now, how do you expect your household's financial situation to change?
Q15. Job Opportunities (last 12 months) Over the past 12 months, do you think job opportunities in Lebanon have become more or less available?	**Q37. General Employment Outlook** How do you expect the availability of employment to change in the next 12 months?

Standby items (11): tested individually in the sensitivity analysis.

Q17. Cost of Living and Prices (last 6 months) How have consumer prices (cost of living) changed over the past 6 months?	**Q39. Inflation Expectations** How do you expect consumer prices to develop in the next 6 months?	**Q16. Business and Investment Opportunities (last 12 months)** Over the past 12 months, do you think business and investment opportunities in Lebanon improved?
Q38. General Business and Investment Outlook How do you expect the business and investment opportunities to change in the next 12 months?	**Q19. Government Performance** How satisfied are you with the government's overall management of the national economy?	**Q18. General Safety (last 12 months)** Over the past 12 months, did you feel that the country is safe to live in?
Q40. Policy Confidence (next 12 months) Looking ahead to the next 12 months, how confident are you that policymakers will make decisions that improve the country's economic and social conditions?	**Q47. Migration Intentions** How likely is it that you will move abroad or emigrate out of Lebanon in the next 12 months to live or work in another country?	**Q49. Outlook for Quality of Life** Overall, considering everything, do you expect your overall quality of life 12 months from now to be?
Q29. Savings Which of the following statements best describes your household's current financial situation?	**Q46. Major Purchase Plans (next 12 months)** Do you plan to make any major purchases in the next 12 months (such as house, land, furniture, household appliances, or a car)?	

4. Principal Component Analysis: Core versus Standby Items

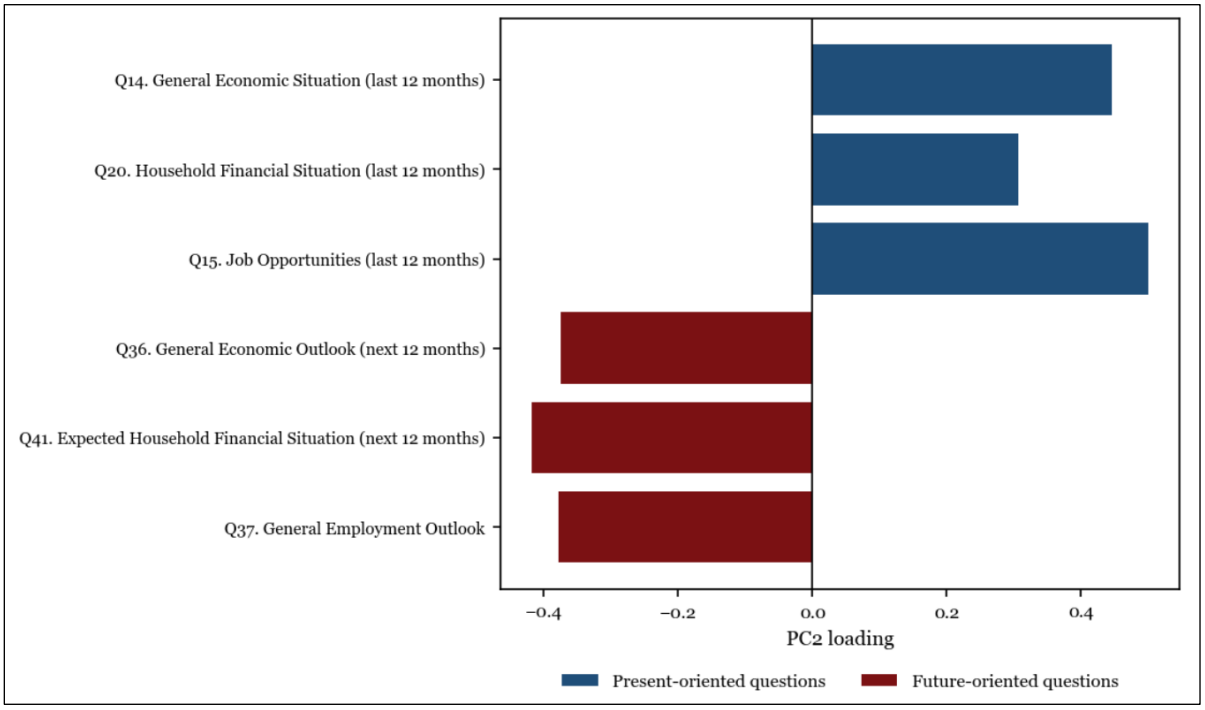
Before testing how sensitive the index is to the addition of more questions, we conducted a preliminary PCA to examine the underlying structure of the core and standby items introduced above. PCA helps assess whether the questions capture a common dimension or several different dimensions. A single underlying dimension would support aggregating the questions into one index, whereas multiple dimensions could suggest that a single index may dilute meaningful differences across the questions. We ran the PCA separately for the 6 core questions and the 11 standby questions to assess the structure of each set.

For the core set, the results support treating the six questions as one construct. Nearly half of the variation across respondents' answers (46.9%) is explained by a single shared pattern, and all six questions align with that pattern in the same direction and with comparable strength. The six questions therefore appear to capture a common dimension of general economic sentiment, supporting equal weighting rather than assigning greater weight to individual items.

The eleven standby questions do not exhibit the same structure. Only about a quarter of the variation in their answers (27.1%) is explained by a single shared pattern, and the individual questions vary considerably in how strongly they align with it. This suggests that the standby questions do not capture one common dimension. Instead, they cover several related areas, including prices, government confidence, business conditions, and migration. For this reason, the sensitivity analysis considers the standby questions one at a time. It also suggests that any future, more systematic use of the standby set would benefit from grouping items by theme, such as prices, government and policy confidence, and migration, rather than treating all eleven as a single undifferentiated pool.

We also examined a question that bears directly on the design of the index: whether the three present-oriented core questions and the three future-oriented core questions measure a single construct or two related but distinct constructs. The evidence supports the latter. When a second component is extracted from the same six questions, it clearly separates the present-oriented questions from the future-oriented questions: every present item aligns in one direction, while every future item aligns in the opposite direction. Within each subset, the first component explains 63.6% of the variance among the present-oriented questions and 68.1% among the future-oriented questions, compared with 46.9% when all six questions are considered together. The two subsets are correlated ($r = 0.42$), indicating that respondents who report more favorable present conditions also tend to report somewhat more favorable expectations for the future, but the relationship is not strong enough to justify combining them into a single undifferentiated score. Taken together, the results support constructing the LPI as separate present and future sub-indices rather than a single undifferentiated score.

Figure 3. Loadings on the second principal component from the combined six-item analysis.



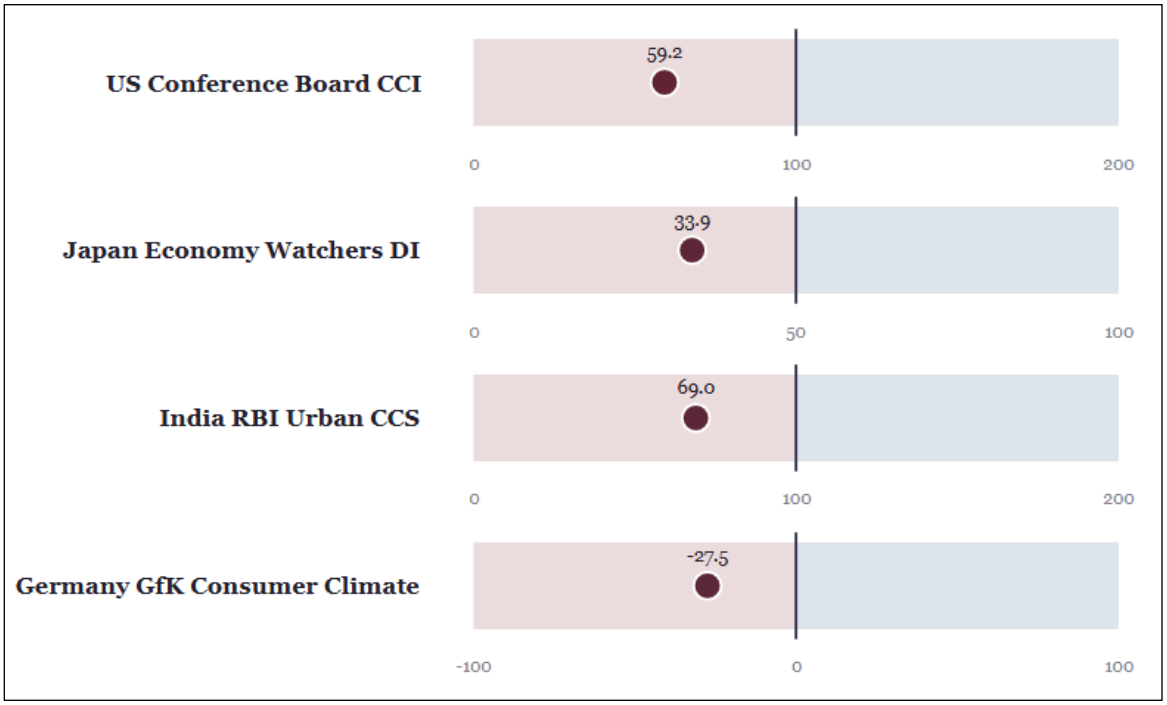
5. Index Simulation and Sensitivity Analysis

5.1. Simulation Setup

The index simulation generates three components of the LPI for each of the four benchmarked methodologies: a present-conditions score, a future-expectations score, and an overall composite. All three are derived from the same set of respondents, ensuring that results remain internally comparable across methodologies and across the two question sets.

Alongside these index outputs, the simulation produces two diagnostic distributions: the share of neutral and extreme responses (the lowest and highest points on the five-point scale), calculated across all items. These distributions provide additional information on how responses are spread across the scale rather than reducing them to a single number. They are used in the analysis below to examine both the sensitivity of the index to additional questions and the changes in response patterns that accompany the expansion of the questionnaire.

Figure 4. LPI Composite Results Across Benchmark Methodologies



5.2. Sensitivity Analysis

After conducting the simulation, we added each standby question individually to the six-question core indices. The objective was to assess, all else being equal, whether each additional question moves the index upward, downward, or leaves it largely unchanged.

For consistency, we refer to the five response categories as *extremely positive*, *positive*, *neutral*, *negative*, and *extremely negative*. We also refer to each question by its descriptive title, with its question number given in parentheses on first mention.

The four methodologies respond differently to the addition of individual questions, and the distinction follows directly from how each translates responses into a score (Figure 5). The three methodologies that collapse the five categories into binary groups, the US CCI, Germany's Konsumklima, and India's CCS, tend to show alternating positive and negative reactions as standby questions are added. Japan's DI approach is different: because it retains all five response categories, it reacts more strongly to the concentration of extreme responses and shifts negatively for nearly every question added. This reflects the fact that DI weighting retains differences in response intensity that the binary approaches do not: whereas extremely negative and negative responses are collapsed into one weight under the other methodologies,

they are still treated as two under DI, and a higher share of extremely negative relative to negative responses drags the index further down. The same principle applies to positive responses: because positive and extremely positive responses receive different weights under the DI approach, their relative shares affect the index differently. Whether this additional sensitivity is desirable for the LPI depends on the distribution of responses observed in the Lebanese data, examined next.

Several standby questions produce consistent shifts across all four methodologies. Inflation Expectations (Q39) and Major Purchase Plans (Q46) reduce all four simulation indices, while Cost of Living and Prices (Q17) lower the score of three of the four methodologies (CCS, DI, and Konsumklima). In contrast, Migration Intentions (Q47) consistently shifts the indices upward across all four methodologies, while General Safety (Q18) and Outlook for Quality of Life (Q49) shift the indices upward under three of the four methodologies. For DI, however, both items shift the index downward. This is consistent with progressive weighting reacting more strongly to the concentration of extreme responses, as discussed above.

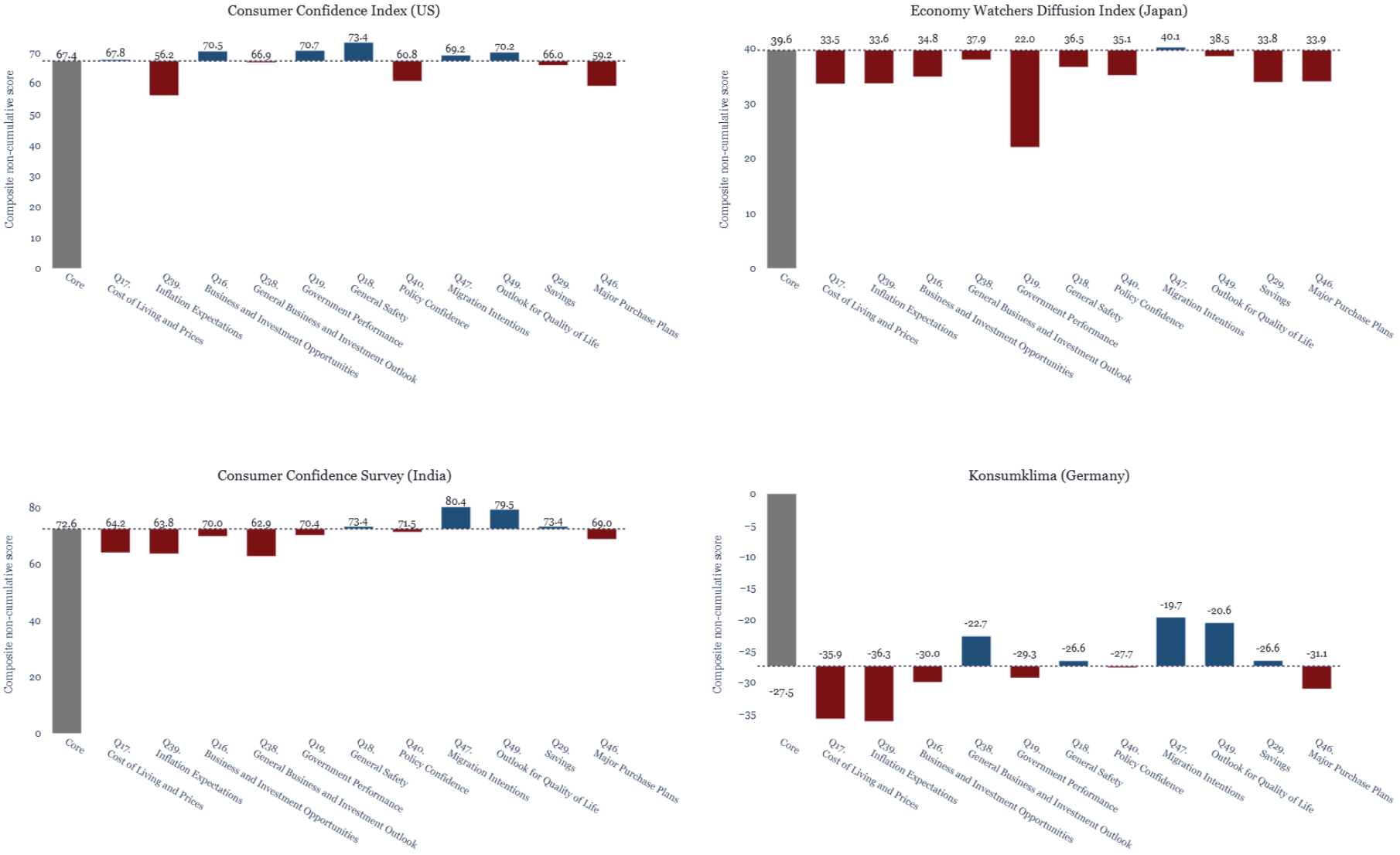
These shifts correspond broadly to the distribution of responses across questions. Using the pilot survey, we calculated the shares of extremely positive, extremely negative, and neutral responses for each question and compared them against the average across questions. The findings align with the index movements described above: Inflation Expectations, Major Purchase Plans, and Cost of Living and Prices, which shifted the indices downward, show high shares of extremely negative responses (47.3%, 65.9%, and 57.1%, respectively), while General Safety and Migration Intentions, which shifted the indices upward, show relatively high shares of extremely positive responses (13.7% and 14.3%, respectively).

The response distributions also reveal broader differences across questions. The highest shares of *extremely negative* responses appear in Major Purchase Plans (65.9%), General Economic Situation (61.0%), Cost of Living and Prices (57.1%), Migration Intentions (50.5%), and Government Performance (50.0%). These questions cover household finances, overall economic conditions, prices, migration, and government performance. Relatively high shares of extremely positive responses appear in Migration Intentions (14.3%), General Safety (13.7%), and Major Purchase Plans (8.2%); two of these three are future-oriented, while three of the five highest *extremely negative* questions concern present conditions.

Four questions show relatively high shares of neutral responses: Household Financial Situation (30.8%), Expected Household Financial Situation (37.4%), General Employment Outlook (26.9%), and Outlook for Quality of Life (37.9%). Three of these are expectation questions, which may reflect greater uncertainty about future conditions or a "wait-and-see" posture among respondents.

Expanding the questionnaire from the six-question core to all seventeen items shifts the overall response distribution toward the extremes: extremely negative responses rise from 31.4% to 35.8%, and extremely positive responses rise from 2.7% to 4.8%, while neutral responses fall from 24.4% to 20.8%. Adding the standby questions therefore changes not only the number of items feeding the index, but the underlying response distribution itself, which is why the specific choice of additional questions shapes the resulting index.

Figure 5. Standby Question Sensitivity



6. Discussion

Four findings from this paper are particularly relevant to the design of the LPI.

First, the six core items form a coherent construct, supporting simple equal-weighted averaging rather than a more complex weighted scheme. This is also consistent with the weighting logic used in all four benchmarked methodologies.

Second, the six core items separate meaningfully into present-oriented and future-oriented groups. In the combined six-item solution, the second principal component separates the three present items from the three future items through opposite signs. Each group is also more internally coherent on its own than the full six-item set. Although the two groups are correlated, the results indicate that they capture distinct aspects of sentiment and support treating them as separate present and future sub-indices rather than combining all six into a single score.

Third, the sensitivity analysis shows that Japan's DI progressive-weighting methodology responds to differences in the intensity of extreme responses, while the three binary-classification methodologies do not. Because the LPS pilot data show meaningfully higher rates of extremely negative than moderately negative responses on several items, a progressive-weighting approach preserves this difference in intensity, whereas the binary approaches do not. We therefore recommend that the LPI draw on the progressive weighting approach, since it is the only one of the four benchmarked approaches that reflects the response intensity observed in the pilot data.

Fourth, the standby items are not uniformly distant from the core construct. Within the standby set's shared pattern, government and policy items (Government Performance, Policy Confidence (Q40)) load more strongly than price items (Cost of Living and Prices, Inflation Expectations). This suggests that the two groups should not necessarily be treated in the same way if the index is expanded beyond the six core items. Government and policy confidence measures are more closely related to the core sentiment dimension and may be stronger candidates for future integration. Price-related items appear to capture a more distinct dimension and are therefore better treated as a separate analytical theme.

Limitations: This paper uses a single pilot wave with n = 182 respondents. The sample has limited representativeness of Lebanon's population, and several districts have too few respondents for reliable subgroup analysis. The core/standby split tested here also reflects the pilot questionnaire design. Similarly, the present-versus-future PCA is based on the same pilot data and is not independently validated on a separate sample. These results can be reassessed once the first full-scale LPS round is fielded.

7. Conclusion

This paper examined established economic-sentiment methodologies to identify design choices that could inform the LPI. The analysis points to two main recommendations: a present/future structure based on the six core items, and progressive weighting that preserves differences in response intensity. We therefore recommend that the LPI combine the present/future structure supported by the pilot data with a progressive-weighting approach similar to Japan's DI, rather than replicating any single benchmarked methodology.

If the index is expanded beyond the six core items, we recommend considering the standby questions individually. Items that are more closely related to the core sentiment construct may be considered for integration, while items such as price sentiment that appear to capture a distinct dimension may be better kept as separate analytical measures.

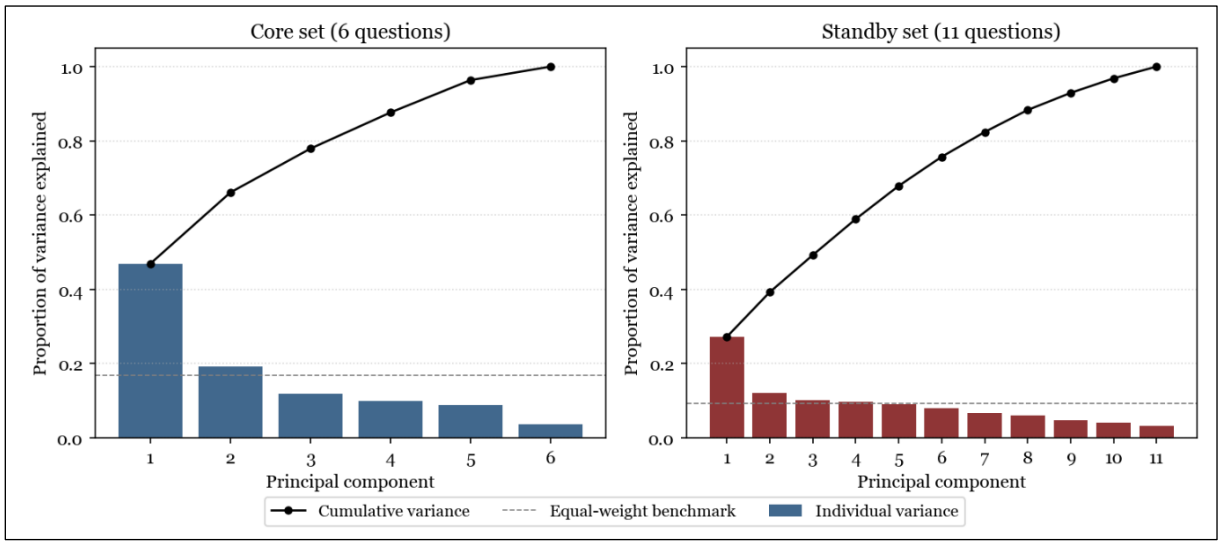
Appendix

Technical Note: Principal Component Analysis

Each item's five response categories were recoded to a neutral 1–5 ordinal scale following the response order as designed in the questionnaire (1 = most negative, 5 = most positive), independent of any of the four benchmarked index methodologies, then standardized to unit variance. Item nonresponse, ranging from 0 to 21 respondents per question, was mean-imputed prior to standardization.

The core 6-item set and the 11-item standby set were analyzed separately. For the core set, the first component explains 46.9 percent of total variance (the second component adds 19.2 percent, for 66.1 percent cumulative); all six loadings are positive and comparable in magnitude (0.34–0.47). For the standby set, the first component explains only 27.1 percent of variance (39.2 percent cumulative with the second), with loadings ranging from near zero (Migration Intentions) to above 0.4 (Outlook for Quality of Life, General Business and Investment Outlook (Q38)).

Figure A1. PCA scree plots: core set versus standby set



For the present-versus-future analysis, a two-component solution was fit on the combined six core items. The second component, accounting for 19.2 percent of the variance, loads positively on all three present-oriented items and negatively on all three future-oriented items, clearly separating the two groups. Exact loadings are reported in Table A1. Analyzed separately, the

present items resolve into one component explaining 63.6 percent of their variance, and the future items into one component explaining 68.1 percent of their variance. The Pearson correlation between each respondent's mean present score and mean future score is 0.422.

Table A1. PC1/PC2 loadings, combined 6-item solution

Question	**PC1**	**PC2**
Q14. General Economic Situation (last 12 months)	0.388	0.445
Q20. Household Financial Situation (last 12 months)	0.401	0.307
Q15. Job Opportunities (last 12 months)	0.385	0.501
Q36. General Economic Outlook (next 12 months)	0.455	-0.375
Q41. Expected Household Financial Situation (next 12 months)	0.340	-0.418
Q37. General Employment Outlook	0.467	-0.377

Table A2. Response distribution by question

Question	**Module**	**% Extreme Negative**	**% Neutral**	**% Extreme Positive**
Q14. General Economic Situation (last 12 months)	Core	61.0	10.4	2.2
Q36. General Economic Outlook (next 12 months)	Core	22.5	23.6	2.7
Q20. Household Financial Situation (last 12 months)	Core	37.9	30.8	1.6
Q41. Expected Household Financial Situation (next 12 months)	Core	6.6	37.4	3.3
Q15. Job Opportunities (last 12 months)	Core	46.7	17.0	2.7
Q37. General Employment Outlook	Core	13.7	26.9	3.8
Q17. Cost of Living and Prices (last 6 months)	Standby	57.1	9.3	2.2
Q39. Inflation Expectations	Standby	47.3	7.7	0.5
Q16. Business and Investment Opportunities (last 12 months)	Standby	38.5	12.1	2.7
Q38. General Business and Investment Outlook	Standby	11.0	26.4	6.0
Q19. Government Performance	Standby	50.0	14.3	5.5
Q18. General Safety (last 12 months)	Standby	28.6	26.9	13.7
Q40. Policy Confidence (next 12 months)	Standby	39.0	10.4	4.9
Q47. Migration Intentions	Standby	50.5	0.0*	14.3

Q49. Outlook for Quality of Life	Standby	6.6	37.9	3.8
Q29. Savings	Standby	26.4	0.0*	2.7
Q46. Major Purchase Plans (next 12 months)	Standby	65.9	0.0*	8.2
Core average (simple mean)		31.4	24.4	2.7
Full 17-item average (simple mean)		35.8	20.8	4.8

* Migration Intentions, Savings, and Major Purchase Plans have four raw response categories, not five, so no respondent can fall at the exact midpoint; 0.0 percent is structural, not a finding.

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