

# Index Construction for the Small Business Pulse Survey

March 10, 2022

Indexes are used to create a numeric representation of a question or set of questions that have non-numeric answers. Four indexes are constructed for the Small Business Pulse Survey (SBPS):

- The Overall Sentiment Index (OSI) assesses the overall effect of the pandemic on businesses.
- The Operational Challenges Index (OCI) assesses the overall effect of the pandemic on business operations.
- The Financial Stress Index (FSI) assesses the financial difficulties experienced by businesses. *(discontinued in Phase 4)*
- The Markets Challenges Index (MCI) assesses the degree of tightness businesses face in the markets for labor, goods and services purchased by businesses, and the businesses' own goods. *(discontinued in Phase 8)*
- The Expected Recovery Index (ERI) summarizes the length of the expected recovery of businesses.

To calculate an index, each question response is first assigned a numeric value prior to the construction of the index. The Methodology section below describes the construction of the indexes.

The tables below show the questions included in each index for each phase of the SBPS as well as the numeric values used for each response in the calculation of the indexes.

## *Overall Sentiment Index*

This index assesses the overall average effect of the pandemic on businesses. Negative values (up to -1) of the index indicate a negative effect (increasingly so as the index value approaches -1), zero indicates little or no effect, and positive values (up to +1) indicate a positive effect (increasingly so as the index value approaches +1).

## *Operational Challenges Index*

This index assesses the average effect on general operations of businesses. Negative values (up to -1) of the index indicate a negative effect on operations (increasingly so as the index value approaches -1), zero indicates little or no effect, and positive values (up to +1) indicate a positive effect (increasingly so as the index value approaches +1).

## *Financial Stress Index*

This index assesses the average financial stress experienced by businesses. Negative values (up to -1) of the index indicate a negative financial impact (increasingly so as the index value approaches -1), and zero indicates little or no financial impact. Due to changing survey content, this index was discontinued in Phase 4 of the survey.

### *Markets Challenges Index*

This index assesses the degree of tightness in labor, inputs, and own goods markets experienced by businesses. Negative values (up to -1) of the index indicate the least tight market conditions (increasingly so as the index value approaches -1), positive values (up to +1) indicate the tightest market conditions. Due to additional survey content, this index was added in Phase 6 of the survey. Due to changing survey content, this index was discontinued in Phase 8 of the survey.

### *Expected Recovery Index*

This index offers a measure of the average expected recovery time of businesses. Negative values (up to -1) of the index indicate that the business needs time to recover (and an increasing recovery period as the index value approaches -1), while zero indicates little or no effect (no recovery period)

**Table 1: Index coding for SBPS Phase 1**

Index	Survey Question	Response Categories	Numerical Value Assigned
Overall Sentiment Index (OSI)	Q1 (Overall Impact - Subjective)	Large negative effect	-1.0
		Moderate negative effect	-0.5
		Little or no effect	0.0
		Moderate positive effect	+0.5
		Large positive effect	+1.0
Operational Challenges Index (OCI)	Q2 (revenue change)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q4 (Closure)	Yes	-1
		No	0.0
	Q5 (Employment)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q6 (Hours)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q7 (Supply Chain Disrupt.)	Yes	-1.0
No		0.0	
Financial Stress Index (FSI)	Q10 (cash on hand)	1-7 days of business operations	-0.8
		1-2 weeks of business operations	-0.6
		3-4 weeks of business operations	-0.4
		1-2 months of business operations	-0.2
		3 or more months of business operations	0.0
		No cash available for business operations	-1.0
		Don't know	Not included
	Q11 (Loan miss)	Yes	-1.0
		No	0.0
	Q12 (Other payments miss)	Yes	-1.0
		No	0.0
	Q13 (Financial assistance)	This business has not requested financial assistance from any source since March 13, 2020	0.0
		<i>All other responses</i>	-1.0
Expected Recovery Index (ERI)	Q15 (Expected recovery duration - subjective)	Little or no impact	0
		1 month or less	-0.2
		2-3 months	-0.4
		4-6 months	-0.6
		More than 6 months	-0.8
		Never	-1

**Table 2: Index coding for SBPS Phases 2 & 3**

Index	Survey Question	Response Categories	Numerical Value Assigned
Overall Sentiment Index (OSI)	Q1 (Overall Impact - Subjective)	Large negative effect	-1.0
		Moderate negative effect	-0.5
		Little or no effect	0.0
		Moderate positive effect	+0.5
		Large positive effect	+1.0
Operational Challenges Index (OCI)	Q3 (revenue change)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q4 (Closure)	<b>Temporary closure</b>	-1
		Permanent closure	-1
		All other responses	0.0
	Q5 (Employment)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q7 (Hours)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
Q9 (Supply Chain)	<b>Any response besides none</b>	-1.0	
	<b>None</b>	0.0	
Financial Stress Index (FSI)	Q12 (cash on hand)	1-7 days of business operations	-0.8
		1-2 weeks of business operations	-0.6
		3-4 weeks of business operations	-0.4
		1-2 months of business operations	-0.2
		3 or more months of business operations	0.0
		No cash available for business operations	-1.0
		Don't know	Not included
	Q13 (Loan miss)	Yes	-1.0
		No	0.0
	Q14 (Other payments miss)	Yes	-1.0
No		0.0	
Q15 (Financial assistance)	This business has not requested financial assistance from any source since March 13, 2020	0.0	
	<i>All other responses</i>	-1.0	
Expected Recovery Index (ERI)	Q19 (Expected recovery duration - subjective)	Little or no impact	0
		<b>Returned to normal</b>	0
		1 month or less	-0.2
		2-3 months	-0.4
		4-6 months	-0.6
		More than 6 months	-0.8
		Never	-1
		<b>Permanent close</b>	-1

**Table 3: Index coding for SBPS Phases 4 & 5**

Index	Survey Question	Response Categories	Numerical Value Assigned
Overall Sentiment Index (OSI)	Q1 (Overall Impact - Subjective)	Large negative effect	-1.0
		Moderate negative effect	-0.5
		Little or no effect	0.0
		Moderate positive effect	+0.5
		Large positive effect	+1.0
Operational Challenges Index (OCI)	Q3 (revenue change)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q4 (Closure)	Temporary closure	-1
		Permanent closure	-1
		All other responses	0.0
	Q5 (Employment)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q6 (Hours)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q9 (Supply Chain)	Any response besides none	-1.0
None		0.0	
Expected Recovery Index (ERI)	Q18 (Expected recovery duration - subjective)	Little or no impact	0
		Returned to normal	0
		1 month or less	-0.2
		2-3 months	-0.4
		4-6 months	-0.6
		More than 6 months	-0.8
		Never	-1
		Permanent close	-1

**Table 4: Index coding for SBPS Phases 6 & 7**

Index	Survey Question	Response Categories	Numerical Value Assigned
Overall Sentiment Index (OSI)	Q2 (Overall Impact)	Large negative effect	-1.0
		Moderate negative effect	-0.5
		Little or no effect	0.0
		Moderate positive effect	+0.5
		Large positive effect	+1.0
Operational Challenges Index (OCI)	Q4 (Revenue change)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q5 (Temporary closure)	Temporary closure	-1.0
		Permanent closure	-1.0
		All other responses	0.0
	Q6 (Employment)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q7 (Hours)	Yes, increased	+1.0
Yes, decreased		-1.0	
No		0.0	
Q11 (Supply chain)	Any response besides none of the above	-1.0	
	None of the above	0.0	
Market Challenges Index (MCI)	Q10 (Difficulty hiring)	Yes	+1.0
		No	0.0
		Not applicable	Not included
	Q11 (Supply chain)	Any response besides none of the above	+1.0
		None of the above	0
	Q15 (Change in demand)	Large increase in demand	+1.0
		Moderate increase in demand	+0.5
		Little or no change in demand	0
		Moderate decrease in demand	-0.5
		Large decrease in demand	-1.0
Q16 (Change in prices)	Large increase in prices	+1.0	
	Moderate increase in prices	+0.5	
	Little or no change in prices	0	
	Moderate decrease in prices	-0.5	
	Large decrease in prices	-1.0	
Expected Recovery Index (ERI)	Q21 (Expected recovery)	Little or no effect	0.0
		Returned to normal	0.0
		1 month or less	-0.2
		2-3 months	-0.4
		4-6 months	-0.6
		More than 6 months	-0.8
		Never	-1.0
Permanent close	-1.0		

**Table 5: Index coding for SBPS Phase 8**

Index	Survey Question	Response Categories	Numerical Value Assigned
Overall Sentiment Index (OSI)	Q2 (Overall Impact)	Large negative effect	-1.0
		Moderate negative effect	-0.5
		Little or no effect	0.0
		Moderate positive effect	+0.5
		Large positive effect	+1.0
Operational Challenges Index (OCI)	Q4 (Revenue change)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q5 (Temporary closure)	Temporary closure	-1.0
		Permanent closure	-1.0
		All other responses	0.0
	Q6 (Employment)	Yes, increased	+1.0
		Yes, decreased	-1.0
		No	0.0
	Q7 (Hours)	Yes, increased	+1.0
Yes, decreased		-1.0	
Q11 (Supply chain)	Any response besides none of the above	-1.0	
	None of the above	0.0	
Expected Recovery Index (ERI)	Q21 (Expected recovery)	Little or no effect	0.0
		Returned to normal	0.0
		1 month or less	-0.2
		2-3 months	-0.4
		4-6 months	-0.6
		More than 6 months	-0.8
		Never	-1.0
Permanent close	-1.0		

## Methodology

Tabulating these responses encompasses calculating the response percentage of the question, as well as creating an index. An index is the weighted average of normalized responses for a question or across a set of questions, usually on a [-1,1] scale. The formulas for the proportion of responses is as follows:

$$PERCENT_a = \frac{\sum TAB\_WGT_i + \sum TAB\_WGT_{i'}}{\sum TAB\_WGT_I + \sum TAB\_WGT_{I'}}$$

Where:

$PERCENT_a$	Weighted response percentage for response category $a$
$\sum TAB\_WGT_i$	Total weight of firms who responded the same way from current panel
$\sum TAB\_WGT_{i'}$	Total weight of firms who responded the same way late from the previous panel
$\sum TAB\_WGT_I$	Total weight of all respondents from the current panel, regardless of response
$\sum TAB\_WGT_{I'}$	Total weight of all late respondents from the previous panel, regardless of response

The calculation of each index may be different for each of the four sets of questions that form the indexes. In short, though, the formula is as follows:

$$EST_i = \frac{TAB\_WGT_j * index_{i,j}}{\sum TAB\_WGT_j}$$

Where:

$EST_i$	Weighted index $i$ value
$TAB\_WGT_j$	Weight of record $j$ in index $i$

$index_j$	Average index value for record $j$ of index $i$
$\sum TAB\_WGT_j$	Total weight of all eligible firms

There are four  $EST_i$  values produced (for  $i = OSI, OCI, FSI,$  and  $ERI$ ).

As an example, suppose there are three companies who responded to the questions in the Overall Sentiment Index (i.e. question 1). Company A has  $TAB\_WGT = 1$ , company B has  $TAB\_WGT = 3$ , and company C has  $TAB\_WGT = 4$ . Company A responded with “Large Negative Effect,” so the index value equals -1. Company B responded with “No Effect” so the index value equals 0. Company C responded “Moderate Negative Effect” so the index value equals  $-0.5$ . Each of these three index values are multiplied by the  $TAB\_WGT$  of the respective company ( $TAB\_WGT$  of company A \* index value of company A) and divided by the sum of the  $TAB\_WGT$  of all three companies to calculate the estimate. In this example, the estimate equals

$$\frac{(-1*1)+(0*3)+(-0.5*4)}{(1+3+4)} = -0.375.$$