CLAIMS

1. A computer-implemented method for optimizing ~~resource~~loan distribution, comprising:

grouping a plurality of ~~resource~~loans into a plurality of cohorts, wherein each of the plurality of ~~resource~~loans is associated with a risk level and a benefit level, and ~~resource~~loans in each cohort share the same risk level and the same benefit level;

obtaining a plurality of provider-level adjustments respectively corresponding to a plurality of providers providing the plurality of ~~resource~~loans, wherein each provider-level adjustment represents a value by which a total amount of ~~resource~~loans from the corresponding provider is allowed to be changed;

constructing an optimization model for determining a ~~resource~~loan flow solution represented by a plurality of cohort-provider-level adjustments, wherein:

the plurality of cohort-provider-level adjustments respectively correspond to combinations of the plurality of cohorts and the plurality of providers, and

each cohort-provider-level adjustment represents a value by which ~~resource~~loans in the corresponding cohort and provided by the corresponding provider are to be changed according to the ~~resource~~loan flow solution; and

according to the plurality of cohort-provider-level adjustments, identifying one or more ~~resource~~loans in each of the plurality of cohorts that are provided by a first provider to be transferred to a second provider, wherein the identifying comprises:

creating a plurality of parallelly executable processing threads respectively corresponding to the plurality of cohorts, wherein each of the parallelly executable processing threads executes instructions to determine a ~~resource~~loan distribution strategy to redistribute the ~~resource~~loans among providers of ~~resource~~loans in the corresponding cohort; and

parallelly executing the plurality of parallelly executable processing threads; and

automatically sending one or more requests to the first provider and the second provider to transfer the identified one or more ~~resource~~loans from the first provider to the second provider.

2. The method of claim 1, wherein the method further comprise:

obtaining a global risk distribution and a global benefit distribution, wherein the global risk distribution corresponds to a distribution of the plurality of ~~resource~~loans at different risk level,

and the global benefit distribution corresponds to a distribution of the plurality of ~~resource~~loans at different benefit level, and

the optimization model comprises:

an objective function that minimizes a difference between, for each of the plurality of providers, the corresponding provider-level adjustment and a sum of one or more of the plurality of cohort-provider-level adjustments corresponding to the provider;

a first constraint requiring, for a given ~~resource~~loan flow solution, a difference between a risk distribution of each provider and the global risk distribution is below a first threshold; and

a second constraint requiring, for a given ~~resource~~loan flow solution, a difference between a benefit distribution of each provider and the global benefit distribution is below a second threshold.

3. The method of claim 2, wherein the difference between the risk distribution of each provider and the global risk distribution is determined as a Probability Stability Index (PSI), calculated as $\sum_m (p_{jm} - q_m) ln \frac{p_{jm}}{q_m}$, where:

m corresponds to a risk level;

j corresponds to an identifier corresponding to a provider;

p_{jm} corresponds to a ratio of an amount of j_{th} provider's ~~resource~~loans at risk level m to an amount of the j_{th} provider's total ~~resource~~loans;

q_m corresponds to a ratio of an amount of the plurality of providers' ~~resource~~loans at risk level m to an amount of the plurality of ~~resource~~loans; and

ln refers to a natural logarithm.

4. The method of any of claims 2-3, wherein the first threshold and the second threshold are identical.

5. The method of any of claims 2-4, wherein the optimization model further comprises a third constraint that requires each of the plurality of cohort-provider-level adjustments is within a range, and a fourth constraint that requires a total sum of the plurality of cohort-provider-level adjustments is zero.

6. The method of any of claims 1-5, wherein the according to the plurality of cohort-provider-level adjustments, identifying one or more ~~resource~~loans in each of the plurality of cohorts that are provided by a first provider to be transferred to a second provider comprises:

identifying one or more first ~~resource~~loans in a first cohort and provided by a first provider, wherein a total value of the one or more first ~~resource~~loans is not greater than a first value associated with a first cohort-provider-level adjustment corresponding to the first cohort and the first provider; and

identifying a second provider, wherein a total amount of the one or more first ~~resource~~loans is not greater than a second value associated with a second cohort-provider-level adjustment corresponding to the first cohort and the second provider.

7. The method of claim 6, wherein the identifying one or more first ~~resource~~loans in a first cohort and provided by a first provider comprises:

sorting ~~resource~~loans in the first cohort and provided by the first provider;

sequentially selecting a maximum number of the sorted ~~resource~~loans with a total ~~resource~~loan amount not greater than a first value associated with a first cohort-provider-level adjustment corresponding to the first cohort and the first provider; and

determining the selected ~~resource~~loans as the one or more first ~~resource~~loans.

8. The method of any of claims 6-7, wherein:

the first cohort-provider-level adjustment comprises a negative value, indicating an amount of ~~resource~~loans to be transferred out of the first provider; and

the first value is an absolute value of the negative value.

9. The method of any of claims 6-8, wherein:

the second cohort-provider-level adjustment comprises a positive value, representing an amount of ~~resource~~loans to be transferred to the second provider; and

the second value is equal to the positive value.

10. The method of any of claims 1-9, wherein the grouping a plurality of ~~resource~~loans into a plurality of cohorts comprises:

grouping the plurality of ~~resource~~loans, based on each ~~resource~~loan's risk level, into one or more first groups, wherein each of the first groups is associated with a risk level from a set of predetermined risk levels;

grouping the plurality of ~~resource~~loans, based on each ~~resource~~loan's benefit level, into one or more second groups, wherein each of the second groups is associated with a benefit level from a set of predetermined benefit levels;

generating the plurality of cohorts respectively corresponding to combinations of the set of predetermined risk levels and the set of predetermined benefit level; and

identifying zero or more ~~resource~~loans from the plurality of ~~resource~~loans to be grouped in each of the plurality of cohorts based on an intersection of the first group associated with the corresponding risk level and the second group associated with the corresponding benefit level.

~~11. The method of any of claims 1-10, wherein the identifying one or more resources in each of the plurality of cohorts that are provided by a first provider to be transferred to a second provider according to the plurality of cohort-provider-level adjustments comprises:~~

~~creating a plurality of parallelly executable processing threads respectively corresponding to the plurality of cohorts, wherein each of the parallelly executable processing threads executes instructions to determine a resource distribution strategy to redistribute the resources among providers of resources in the corresponding cohort; and~~

~~parallelly executing the plurality of parallelly executable processing threads.~~

~~12~~11. The method of any of claims 1-10~~11~~, wherein for each of the plurality of cohorts, the corresponding processing thread performs iterative operations comprising:

dividing the plurality of providers into one or more providing providers and one or more receiving providers according to the plurality of cohort-provider-level adjustments; and

for each of the receiving providers, iterating the providing providers to collect one or more ~~resource~~loans in the cohort to transfer from the providing providers to the receiving provider based on cohort-provider-level adjustments associated with the providing providers and the receiving provider.

~~13~~12. A system for optimizing ~~resource~~loan distribution, comprising one or more processors and one or more non-transitory computer-readable memories coupled to the one or

more processors and configured with instructions executable by the one or more processors to cause the system to perform the method of any of claims 1-~~12~~11.

~~14~~13. A non-transitory computer-readable storage medium configured with instructions executable by one or more processors to cause the one or more processors to perform the method of any of claims 1-~~12~~11.

~~15~~14. An apparatus for optimizing ~~resource~~loan distribution comprising a plurality of modules for performing the method of any of the claims 1-~~12~~11.