

Expanding or increasing: index-based social protection scheme in Niger



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Motivation

- Niger suffers from widespread poverty, extreme weather conditions, and social distress
- Currently SP programs in Niger are mostly emergency programs
- Want to understand the potential for an index-based SP scheme that pays a constant amount to all beneficiaries hit by a bad shock in a given area.
- What's best:
 - to expand the number of benefit recipients? or
 - to increase the level of benefits for given beneficiaries?

Plan of the presentation

- Study the trade offs between expanding the number of beneficiaries and increasing the level of benefit of a fictional cash transfer program in Niger
 - Simple model to frame the question
 - Data
 - Results

Planner's optimization problem

$$\max_{R,B} Eu(C)$$

$$\text{sub } C = \begin{cases} \tilde{C}(\varepsilon_{ij}, \eta_j) + R B(k_j, R, \eta_j) & \text{with prob } p \\ \tilde{C}(\varepsilon_{ij}, \eta_j) & \text{otherwise} \end{cases}$$

- ε_{ij} household specific shock
- η_j regional specific shock
- R benefit recipients receive a benefit B
- Cost of program (k_j) include: data-processing and monitoring cost & distribution cost

Advantages of this framework

- Lays out all the elements of the analysis
- Provides a simple definition of the measure of interest: the MRS

between expanding R and increasing B , $\frac{\partial R}{\partial B}$:

$$\frac{\frac{\partial u}{\partial B}}{\frac{\partial u}{\partial R}} = \frac{R}{B + \frac{\partial B}{\partial R} R}$$

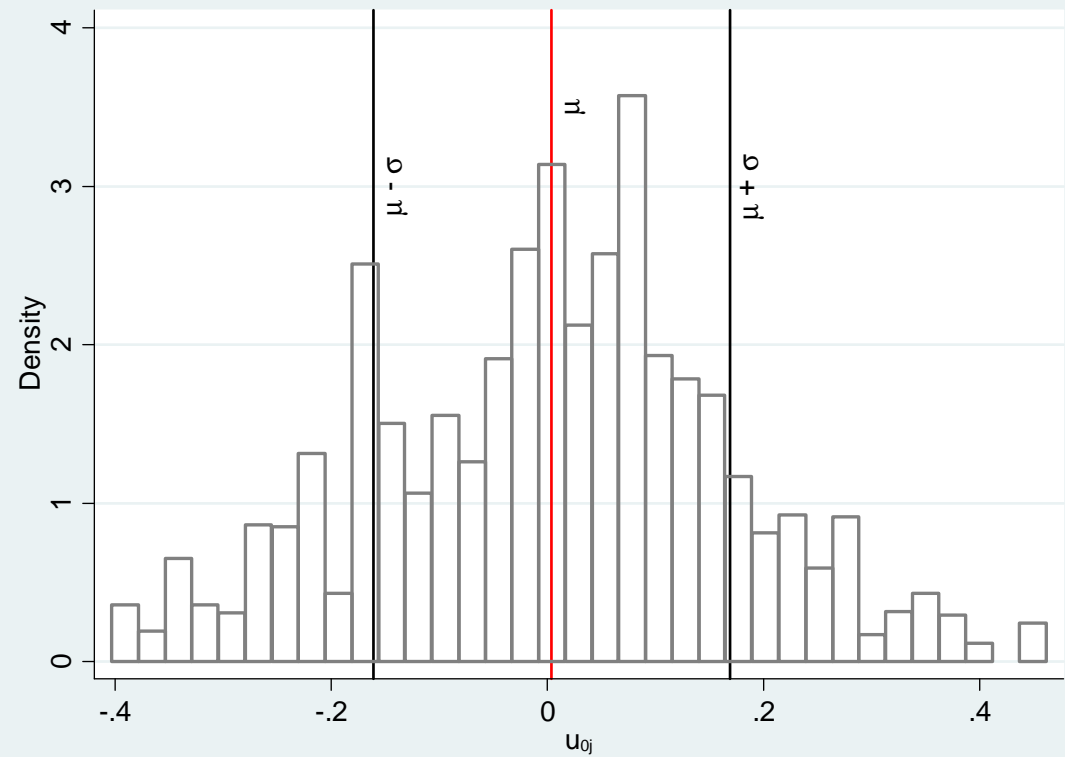
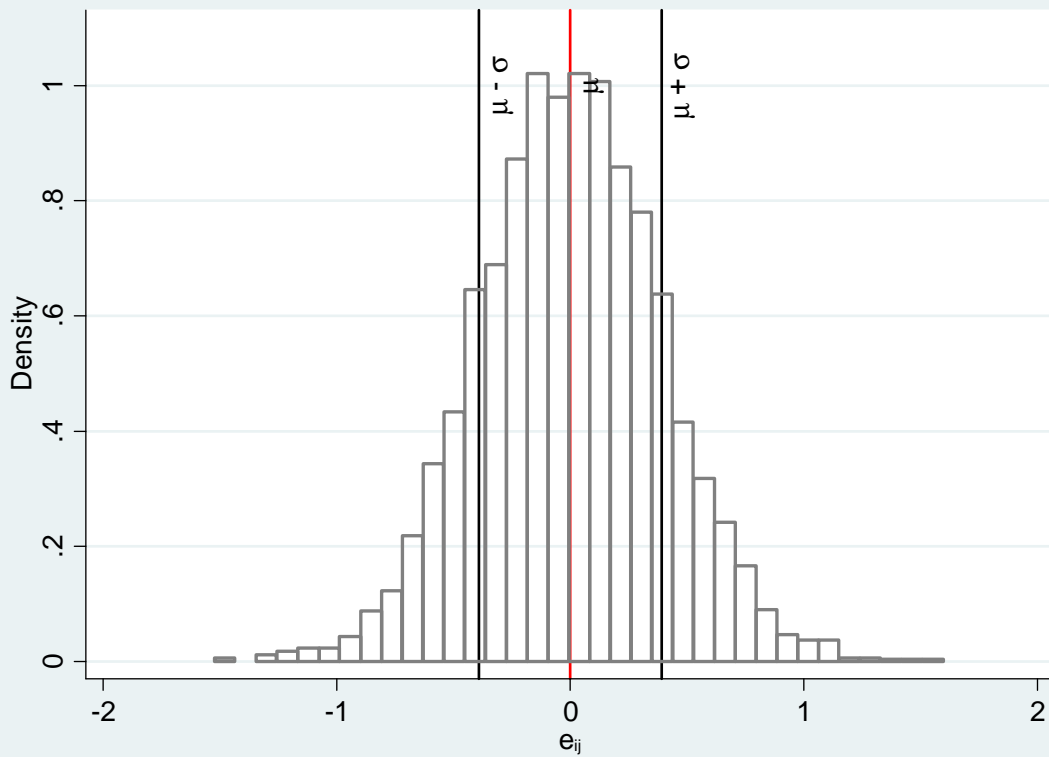
Three main sources of data

- 2012 Census: disaggregated population data
- 2011 LSMS: national-representative Living Standard Measurement Study survey
 - household characteristics
 - community characteristics
- 1983-2013 Water Requirement Satisfaction Index (FAO methodology):
 - Indicator of crop yield reduction based on water availability during the crop growing season

Measuring consumption shocks from LSMS

- Ideally estimated from panel data to control for unobserved heterogeneity.. but delays in data collection prevented that
- Multilevel analysis: $C_{ij} = \gamma_{00} + \gamma_{10}X_{ij} + \gamma_{01}Z_j + u_{0j} + e_{ij}$
 - X_{ij} : 10 HH-level controls (e.g. age, educ, HH size, occupation, own land/cattle, ag asset index)
 - Z_j : 5 community-level controls (e.g. infrastructure index, schooling/econ activities in community)
 - u_{0j} : random intercept at community, proxy for covariate shocks
 - e_{ij} : HH-level residual, proxy for idiosyncratic shocks

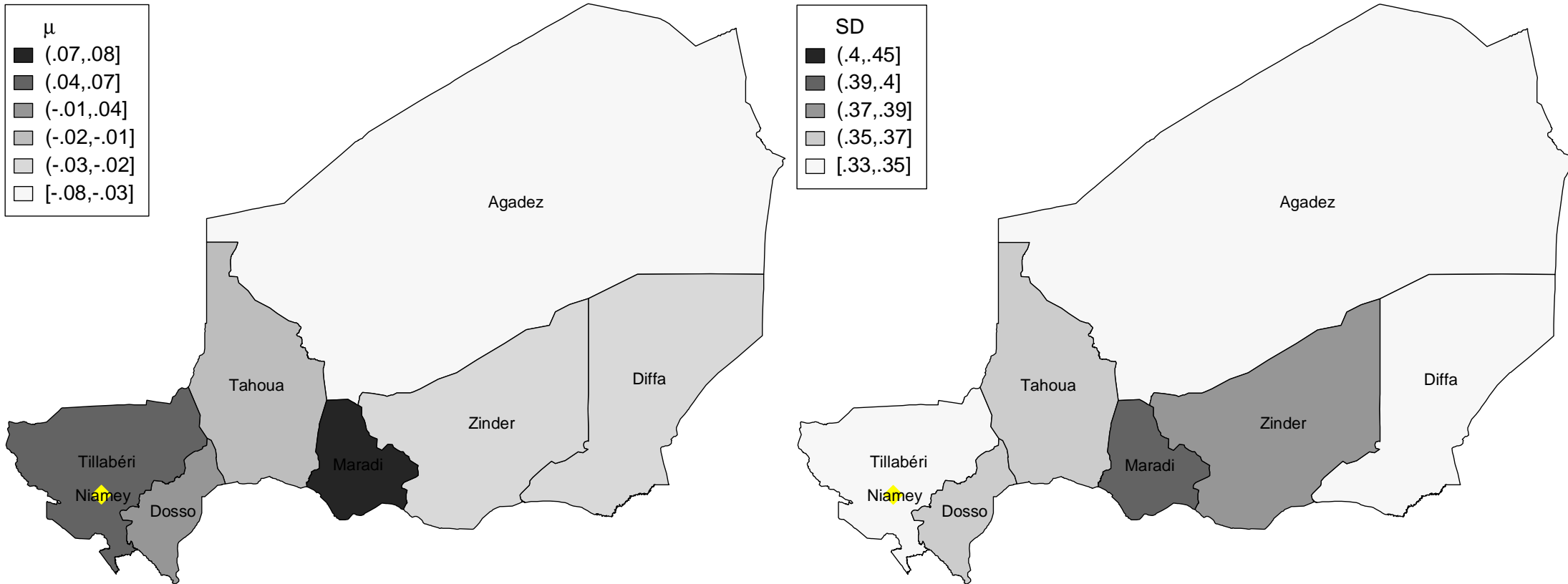
Estimated shocks from LSMS



Both zero mean shocks, but idiosyncratic volatility much higher

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Idiosyncratic shock from LSMS

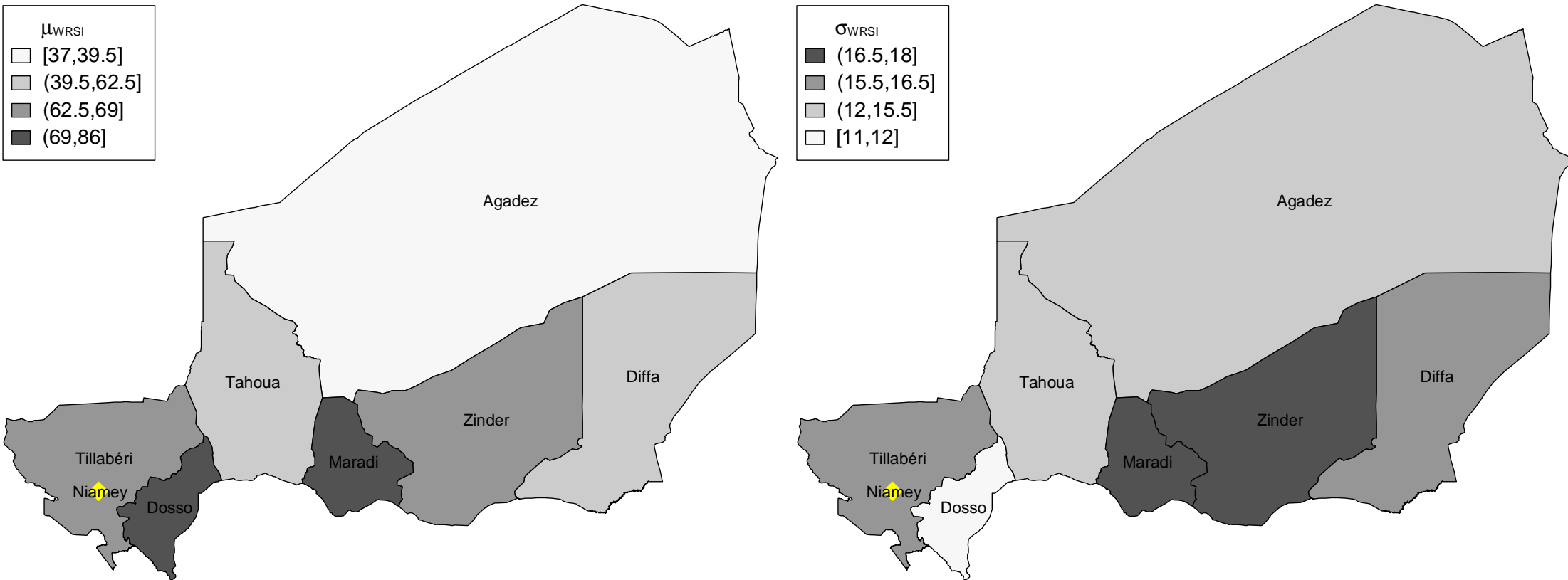


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Covariate shocks from WRSI

- Period: 1983-2013
- WRSI: For each region compute the estimated millet yield based on water availability during growth season
 - Range between 0 and 100
 - WRSI of 50 = crop failure
- Allows exploiting time-series variation to get probability of being hit by bad covariate shocks

Covariate shock based on WRSI



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Model parameters

- 5% of GDP allocated for SP program
- Lump sum cost for SP in another region: \$20,000-30,000
- Lump sum cost to disburse SP payout/region: \$150,000-\$200,000
- For each region: p , probability of bad shock, = $\text{Prob}(\text{WRSI} \leq 50)$
- Shocks are binary distributed:
 - 1 with probability $(1-p)$
 - Value of u_{0j} and e_{ij} at corresponding p

Calculating benefits from SP

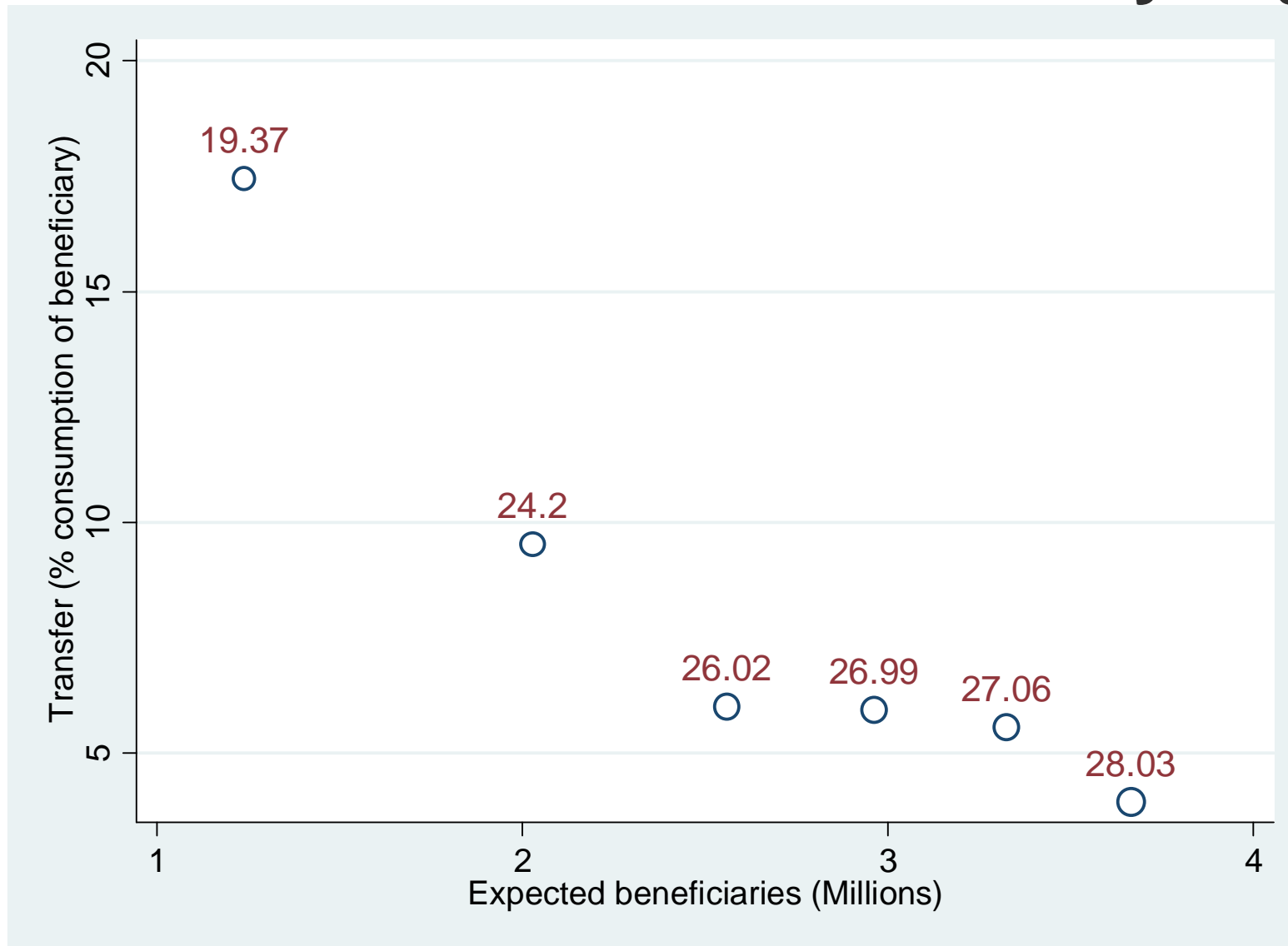
- Assume CRRA utility function, with $\rho = 2$
 - Concavity as Govt funding SP value more \uparrow consumption of poorer

$$Eu(c^{\text{no SP}}(1 + \omega)) = Eu(c^{\text{SP}}), (1 + \omega)^{1-\rho} Eu(c^{\text{no SP}}) = Eu(c^{\text{SP}})$$

$$\omega = \left(\frac{Eu(c^{\text{SP}})}{Eu(c^{\text{no SP}})} \right)^{\frac{1}{1-\rho}} - 1$$

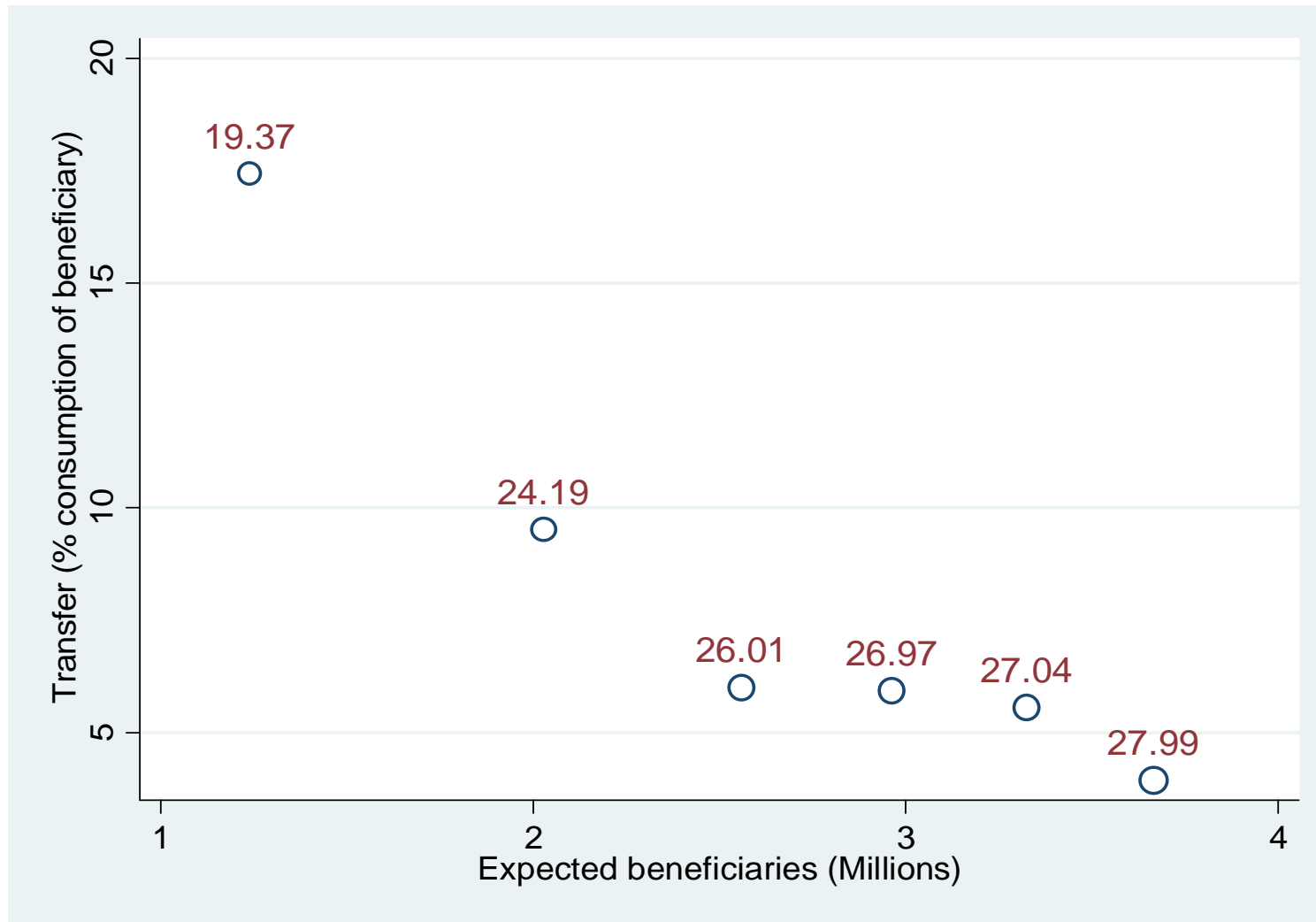
- Gains are computed as national weighted average of percentage increase in consumption among poor and rich households as SP program is progressively rolled out to one more region

Gains from index- based SP are very large



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Remain high even when assuming higher cost of design and delivery



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To expand or to increase? To Expand



Region covered by Index-based SP	Payout US\$	Payout % consumption	Gains wrt baseline of no SP	Gains wrt SP based on traditional PMT
1	181	17	19.4	10.7
2	110	10	24.2	12.6
3	87	6	26.0	13.9
4	75	6	27.0	15.2
5	67	6	27.1	15.5
6	61	4	28.0	16.6
7	61	3	28.0	16.6

Assuming: low cost of implementation; utility from PMT based on existing cash transfer program rolled out in Tillabéri and Tahoua

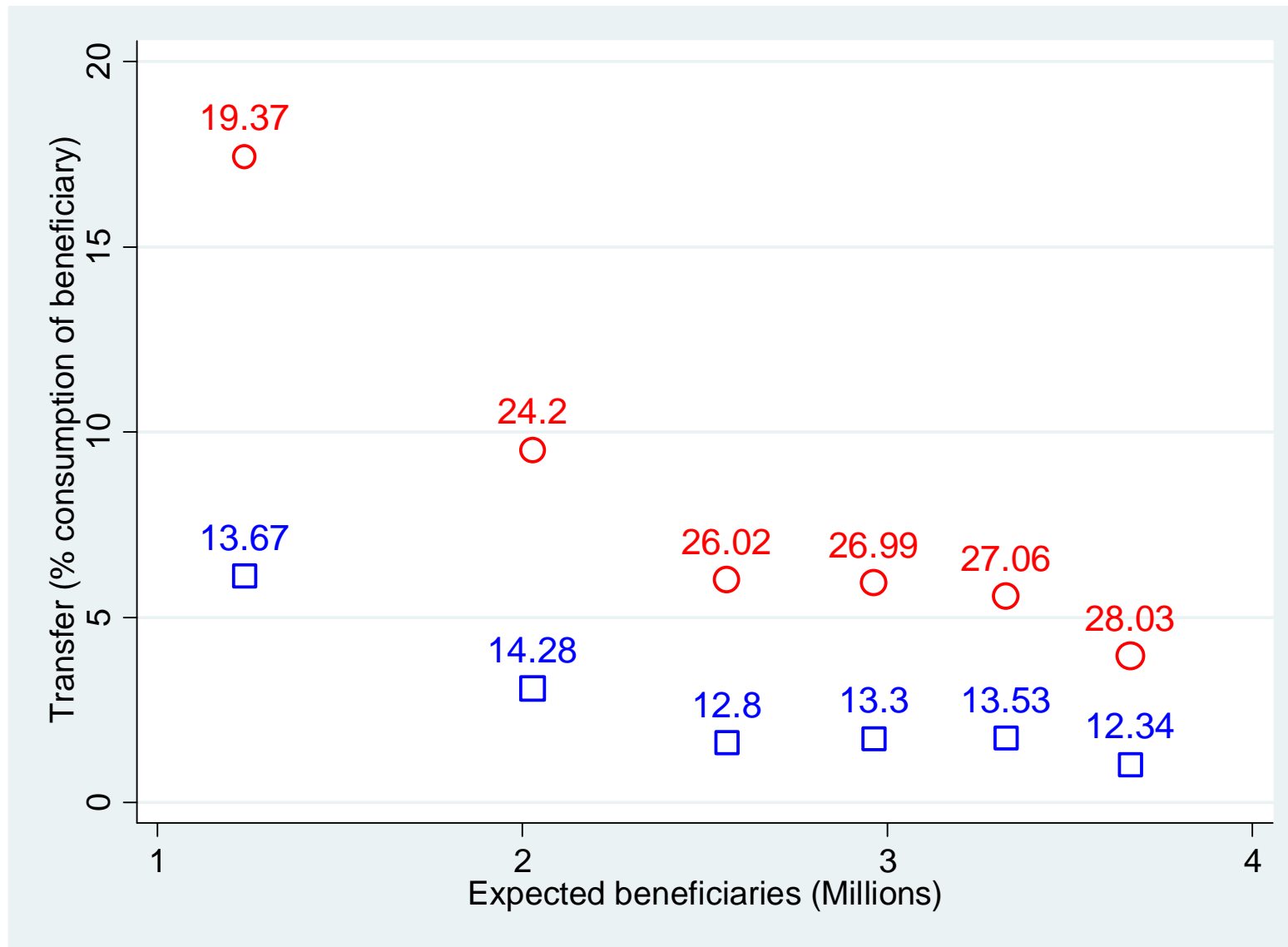
What's behind these very large gains?

- SP payouts are manna from heaven –taxpayers not paying for them, consistent with reality
- Widespread poverty in Niger implies small gains in consumption for an extra beneficiary are more welfare enhancing than additionally raise consumption of selected beneficiary
- Shocks in this framework are painful:
 - With 22% probability, consumption is cut to 35% (e_{ij}) or 26% (u_{0j}) of normal level (\tilde{C})
 - With 11% probability, consumption fall to 9% when hit by both shocks
- Welfare gains include two elements:
 - Higher consumption because of SP payout
 - Lower consumption volatility since payout is issued when hit by covariate shock

Which component matters more?

- Keep constant total expected payout
- Assume a constant (smaller) transfer is issued for any state of nature
- Compute the gains from higher consumption
- Difference between these and the original gains measures gains from lower volatility of consumption

Not obvious which component matters more



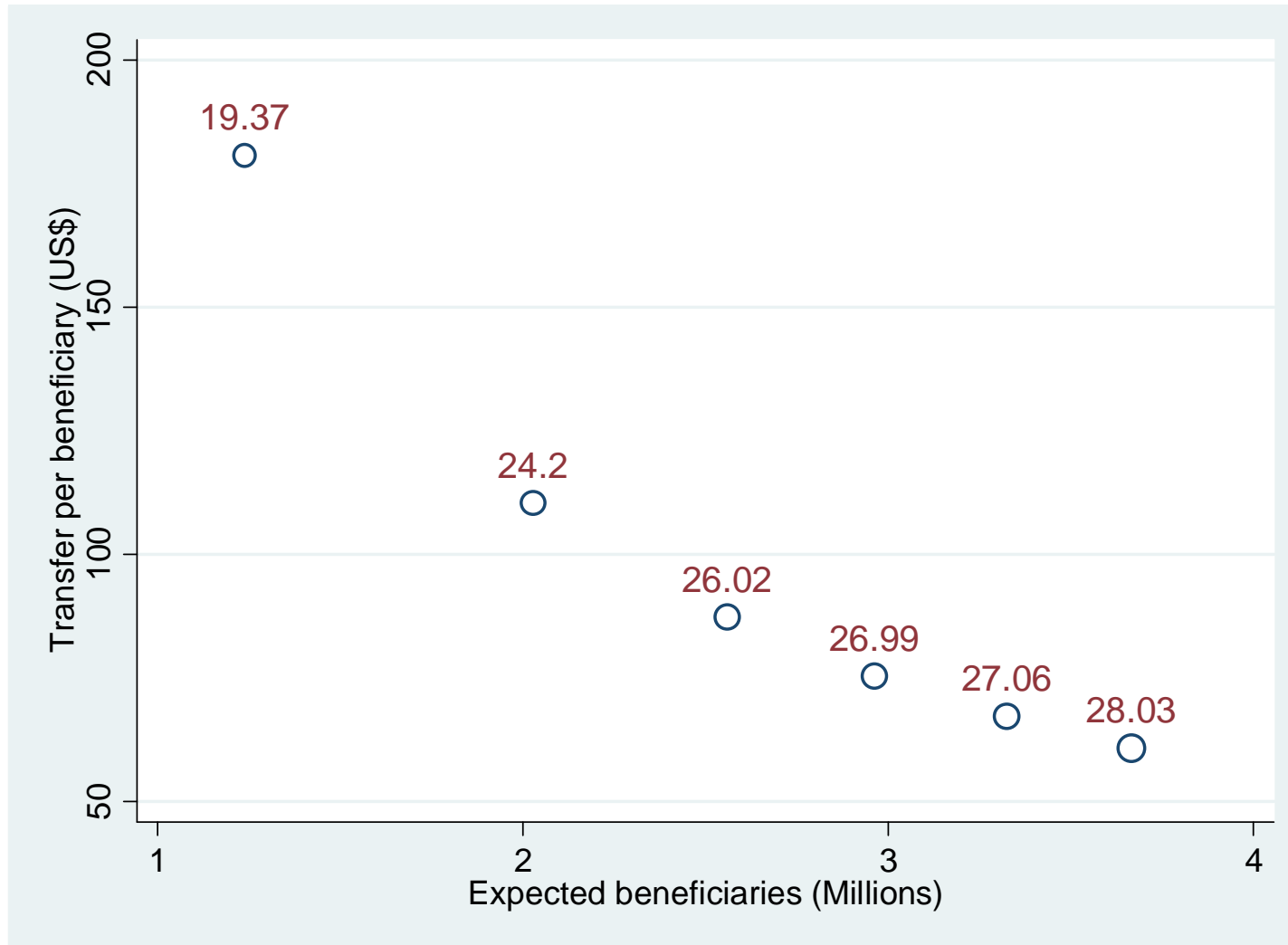
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Conclusion

- Index-based SP scheme has high potential, in theory could do even better than PMT-based SP
- Widespread poverty & shocks with large impact on consumption suggest benefits from expanding the number of beneficiaries outweigh those from increasing level of benefits
- Gains typically tend to come from reduced consumption volatility, but not always the case

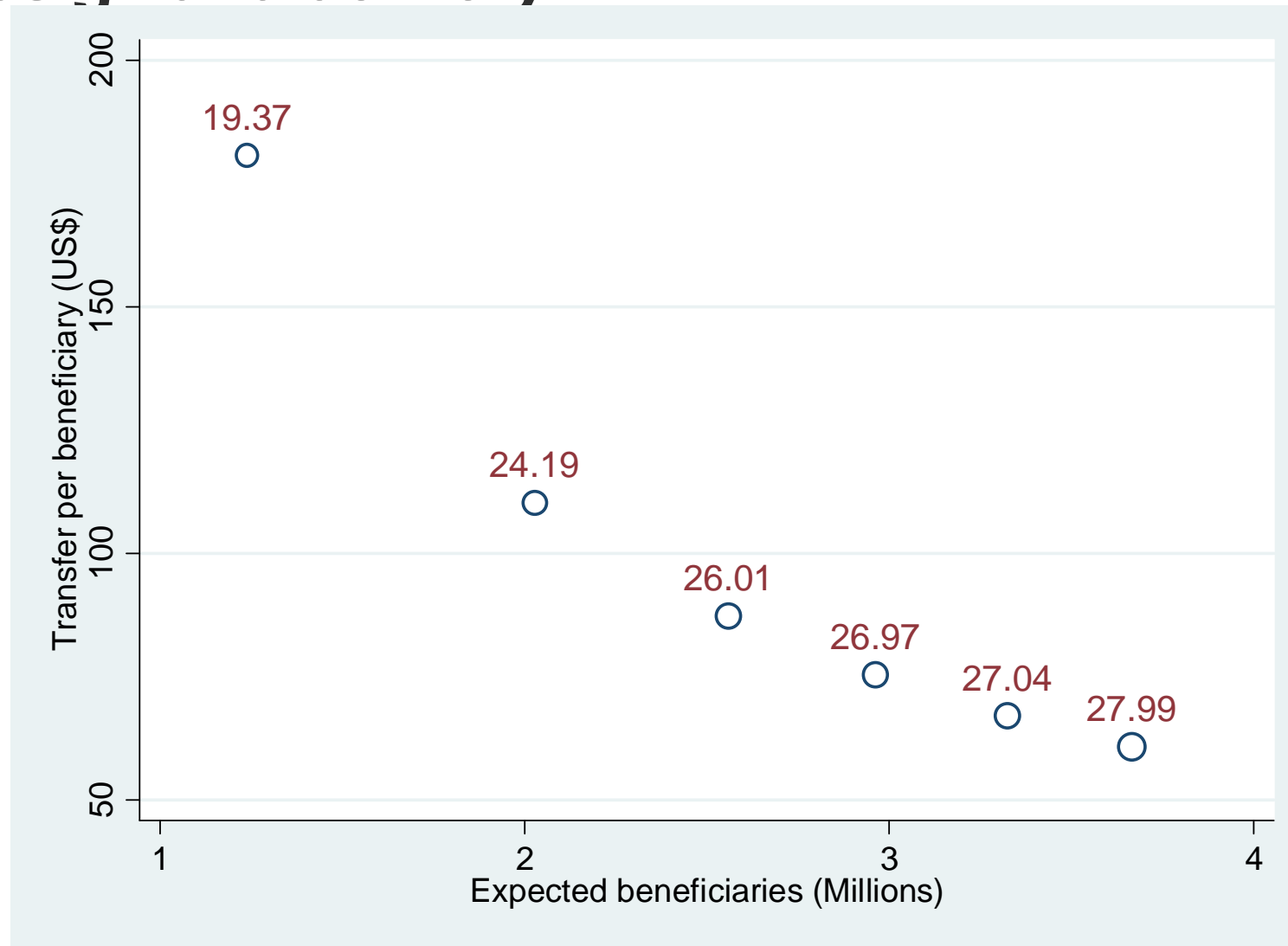
Thank you!
Comments welcome

Gains from index- based SP are huge



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Remain high even when assuming higher cost of design and delivery



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