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Introducing Reliability Economics: Safeguarding the Economy in the Same Way We Do Products

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Reliability engineers understand the concept of being proactive rather than reactive to ensure reliable products. Yet our economy more often than not appears to lack reliability in its design. Logic dictates that if industry spends millions of dollars each year ensuring viable products using the science of reliability, then it might make sense to utilize this same set of tools in a similar manner to safeguard our economy. I have tried to convey this concept in my recent book [1]. Often, it makes sense to utilize existing applied sciences in one area to those in a different arena. Economics, after all, is just a set of tools for understanding our working economy. Here, we look at a new concept, that of reliability macroeconomics (also referred to here as reliability economics).

There are three basic activities that we can adapt from industry for applying reliability science to the economy [2]:

- Perform root-cause analyses of failure modes supported by facts.
- Design-in reliability improvement for the economy.
- Perform verification testing of corrective actions.

Implementation of these methods can make enormous sense, just as it does in industry. First, ensure that we identify the root cause economic issues, and then look to make improvements, focusing on designing-in reliable solutions for the economy (as opposed to short term solutions). The key method that can be utilized to design-in reliability is the method of Failure Modes Effects Analysis (FMEA). FMEA provides an excellent structural method that can be applied by a multidisciplinary team. Just as industry has learned that each design requires an FMEA assessment, economists and congressmen should learn the importance of using problem solving methods for every proposed policy and economic design. There is a serious need for problem solving methods for the layperson, congressmen and women, and economists to help guard against potential policy failures. Currently, our policies are scrutinized by votes rather than first being subjected to proper FMEA assessment; and the consequences can be significant. This tool aids in accurate investigative methods for uncovering design flaws. It should be a requirement for each congressperson to learn and use.

Finally, as in product reliability, feedback is required through verification testing. Testing takes time, and needs to be built into any proposed economic policy, especially when we are dealing with the economy, and should be done in phases throughout any significant design change to the economy. For example, if Alan Greenspan had performed stress-related testing of bank deregulations over time, he would likely have observed the subprime mortgage abuses by lenders, and the irresponsible banking irregularities occurring; had he done so, perhaps he would not have allowed this widespread deregulation policy that has led to our housing crisis.

We know that, during our recession, the economy has in fact been under a stress test, and many failures have surfaced. Our economy's engine uses too much wasteful oil, is inefficient on gas, has too many parts not made in America, and our economy's designers/advisors have, over time, failed to build-in reliability. We have gone into debt trying to fix the economy's engine with needed improvements. Our economists and politicians have taken, and continue to take, enormous risk without safeguarding and building-in reliability macroeconomics. In part, that risky behavior is what the national debt indicates; it is a measure of fiscal irresponsibility, and unreliability. It is reasonable to expect that reliability methods, when applied

to the economy, can turn out to be surprisingly easy to apply, would be unavoidably logical, and will provide an additional measure of certainty to our economy.

One key to success would also be to maintain a proactive approach. That is, our economic policies cannot afford to be reactive any longer, putting out fires in the economy as they occur. We need to be proactive, and design reliability into our economic policies, so that these fires do not occur in the first place.

As one illustration, Table I is an FMEA from my book [1] performed on the key issue of the "Federal Tax Structure".

Table 1 Failure Modes and Effects Analysis on the Federal Tax Structure [1].

Key Issue	**Potential Failure Modes**	**Potential Effect of Failure**	**Root Cause(s) (RC)**	**Root Cause Rating**	**Design Controls**	**Possible Corrective Actions**
Tax Struc-ture (Federal Income)	1) Loss of needed government revenue 2) Separation of wealth increase 3) Wealthy may have no income to tax	1a) Poor monetary circulation 1b) Governmental national debt increases 2) Reduce money for average worker 3) No income tax revenue from wealthy retirees	1a) Tax bracket stops at 35% 1a) Excess tax write-offs 1, 2) Government administrative issues 3) No tax on wealthy retiree assets 4) Nonresident alien tax issues	1) 9 2) 9 3) 7 4) 3	1a) Assess extending bracket 1b) Review and close loop holes 1, 2) Investigate administrative issues with fair tax implementation Review possible salary cap 3) Asset tax review 4) Increase on export serviceable tax	1a) Extend brackets fairly 1b) Close loop holes 2) Do FMEA on govt. admin issue 3) Asset tax 4) Service export tax increase—Ex. foreign athletes

In this FMEA, we provide a simple rating system (1 through 10) on root cause importance rather than as traditionally done for failure modes. We take this approach because an economic failure mode tends to have many root causes. All the suspected root causes need to be substantiated with facts. This, however, provides an initial launch to our investigation. For example, one basic root cause discussed for the failure mode "Loss of government revenue" is that the 2009 tax structure currently stops at 35%. We seem to accept this limit. Yet logic dictates otherwise. That is, prior to 35%, the more money a person makes, the higher his tax bracket, except after the upper limit of $372,950. The question is, why does it stop there? It should continue to be consistent, and fair. This observation indicates that a disproportionate tax is removed at the lower compared to the upper income tax bracket (i.e. it is unequal at the upper and lower ends). It also appears that the upper tax bracket is not adequate to deal with today's rising income for highly compensated individuals. One person made $3.7 billion dollars in a year, and was actually taxed at the 15% rate. This inequality poses a long term reliability economic hoarding threat. The failure mode is the separation of wealth with its effect leading to continued tight money in a recession. This conclusion not only prompts concern regarding the tax structure, but one has to question why the government has ignored it.

We see that problem solving requires a diverse team approach that could easily be done using the FMEA structural approach. Such a team should be made up of democrats, republicans, reliability economists, and other experts in the area of interest so that everyone signs-up to identify before-hand the failure modes,

their root causes, and provide inputs for design controls and corrective actions. It would not only force more of a bipartisan situation, but is also the first step to assuring a reliability economic mindset. Relying on the perspective of our congressmen who are mainly wealthy lawyers, or by our economists who also have narrow perspectives on finance, is a limited way to find solutions for multiple complex issues. If the lawyers and economists were enough, we would not have the results which have transpired.

The idea is that reliability science not only holds excellent tools but also prompts a different mindset approach forcing a reliability focus, leading us to address economic issues in a new light. The approach exposes hazardous conditions including potential wrong-doings, failed policy problems, and serious policy interactions that a reliability economist could find. For example, many people may not realize that we have significant losses in tax revenue from years of free trade deficits that effects our national debt [1]. The effect is that ordinary U.S. tax payers are essentially paying a tariff through this national debt increase on excess imports, which violates both the intent of the free trade agreement, and indirectly violates constitutional law [1]. This mindset of reliability, and its tools should be applied to our economy. Just as reliability engineering seeks to predict and safeguard products, we would want our economy to demonstrate a measure of "reliability growth." Such growth in reliability is measured by a reduced rate of product failure over time. In a similar manner, we need to have measurable, meaningful reliability metrics for the economy consisting of our unemployment rate, home and business failure rates, and so forth. These rates of failure can be modeled using traditional reliability mathematics like Weibull analysis. Such measures, when tracked frequently, can help warn us prior to a crisis, so that corrective actions can be applied in a timely manner. This approach is analogous to quality field-data tracking of a product, which is done by industry. However, here we work with these field quality metrics in a similar manner through the science of reliability mathematics that is also capable of modeling any phase with an increase in the failure rate, steady state, or economic reliability growth.

If we seek unbiased facts, and apply logical analyses that stem from real root causes; and if fixes are aimed at efficient reliability in the economy, with tests planned over time to verify that improvements are working; then we will end up with a more trustworthy economy. After all, we ideally want an economy whose engine runs dependably over time without failures. That's the goal of Reliability Economics.

References

[1] A. Feinberg, *The Truth of the Modern Recession – Root Causes and Reliable Solutions, WE-Economy Press, 2009.*

[2] *A.* Feinberg and D. Crowe *, Eds, Design for Reliability,* CRC Press, 2001