“Unpleasant arithmetic” is a popular economists phrase coined by Thomas Sargent, the 2011 economics Nobel Prize laureate and Neil Wallace in an influential 1981 paper simply titled “Some unpleasant monetarist arithmetic“ that sought to demonstrate that monetary policy is a useless anti-inflation tool. The deadpan title had a double meaning, the truly horrendous math and the unsettling policy implications. The good news is that Kenya’s standard gauge railway (SGR) arithmetic turns out to be unpleasant only in one dimension. The bad news is that it is the money end of the business, not the math.

It is helpful to start by putting the scale of the project in perspective.

UK’s Crossrail project, an expansion of the London commuter rail system has been billed as Europe’s most expensive infrastructure project, with a price tag of US$ 23 billion, five times the cost of the Mombasa-Naivasha SGR. But the project amounts to less than one percent of UK’s $2.6 trillion dollar economy (37 times Kenya’s), and 3.5 percent of government revenue. The UK borrows long term domestically at between 1.5—2.5 percent per year. If we take the higher figure, the interest cost of financing the Crossrail project is about 0.1 percent of government revenue. The most expensive infrastructure project in Europe increases the UK’s public debt by less than one percent of GDP and puts no pressure on the government budget.
When it was starting in 2014, the $3 billion outlay for the Mombasa-Nairobi segment amounted to 5.4 percent of GDP and 11 percent of government revenue. The cost to completion (Mombasa to Malaba), estimated at US$8 billion at the time, was in the order of 15 percent of GDP and 73 percent of government revenue. If we were to finance it from floating international bonds, the interest cost on the $4.5 billion dollars we’ve borrowed already would translate to 2.5 percent of government revenue, 28 times the cost of Crossrail’s debt burden on UK’s taxpayers.

But the Chinese bank loans have a higher revenue burden than bonds since we have to pay both interest and principal. We now know that the cost is in the order of KSh 50 billion per year currently, equivalent to four percent of revenue. That translates to 45 times CrossRail’s debt burden on UK taxpayers. Moreover, as noted, the UK borrows domestically, with no currency risk. The shilling has depreciated 18 percent since we borrowed, raising the interest cost by KSh 3 billion a year.

To contemplate a project of that scale, you need a very high degree of certainty of its viability. It is otherwise reckless.

The key selling point of the SGR project is that it would get the huge trucks off the road. It would also be cheaper and faster. The public was told that it would haul 22 million tonnes of freight a year. As this column pointed out then, this was always doubtful.

A typical locomotive hauls of between 3000 and 4000 tonnes of freight. We now know that the SGR locomotives’ capacity is 3000 tonnes. The 22-million ton target works out to 20 trains a day, a train every 80 minutes. But the government has also marketed passenger services, which brings you down to a train an hour. It matters that over 90 percent of the freight is imports. If it was equally divided between imports and exports, you would need half the departures. But with virtually all freight going one way, a departure every hour both ways on a single track is a stretch.

We now know courtesy of a study by government policy think tank, KIPPRA, that the operational capacity of the railway in terms of the rolling stock already acquired and configuration of the line (e.g. provisions for trains to pass each other), is twelve trains a day, with provision for four passenger and eight freight trains a day, with a capacity of 8.7 million tonnes a year.

Besides falling far short of the so called design capacity, this raises a serious question about the viability of extending the railway to Uganda. Currently, the volume of transit cargo coming through the port of Mombasa is close to eight million tons, just about the same capacity as the railway. Thus, the current operational capacity cannot serve both the domestic and transit cargo—it is one or the other. To serve both will require expanding the capacity on the completed section to at least double what it is, escalating the already exorbitant cost even further. In a decade or so, it will still come down to a question of domestic or transit freight. If the railway will have been extended, it will only make business sense to carry transit cargo, begging the question why Kenya would have borrowed so much money to build a railway for other countries.

The railway has been sold as a commercially viable project, that is, it would pay for itself. This column challenged this claim from the outset. In the first of many columns, I maintained that the railway could not pay, and that the debt would be paid from the public purse. This has now come to pass.
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The only feasibility study I have seen was done by the contractor China Road and Bridge Corporation (CRBC). It is possible that the lenders could have conducted their own feasibility studies as other development financial institutions do, but if such exist, they are a closely guarded secret.

The CRBC feasibility study has a chapter titled economic evaluation, though it is unlike any investment appraisal I have come across. It asserts that the project has “high profitability” and “financial accumulation ability”, but there are no cash flow projections to back this up. It presents Net Present Value (NPV) of three different configurations of US$ 2.0, 2.4 and 2.6 billion as evidence of viability, leaving one at a loss to understand how this justifies borrowing US$3.2 billion for the project. NPV is the current value of the future earnings of a project and should be higher than the cost of the project.

Be that as it may, the railway’s economic justification turns on cheap freight. The study asserts that the railway would turn a profit with a tariff of US$ 0.083 a ton per kilometre (8 US cents). Containers weigh between 20 and 30 tons, hence the study’s tariff at the time translated to between US$ 830 and US$ 1245 (Ksh. 70,000 to Ksh. 100,000) to freight containers from Mombasa to Nairobi. It puts road haulage cost at US$ 0.10 to US$ 0.12 (10 to 12 US cents), hence the proposed SGR tariff would have been 20 to 45 percent cheaper than trucking.

According to the Economic Survey, the source of official statistics, in 2012, when the feasibility study is dated, railway freight revenue was Ksh. 4.40 a ton per kilometre, which works out to $0.052 cents. In effect, the SGR claimed that it would make freight cheaper, while in fact its break-even tariff was higher than the railway tariff prevailing at the time. Even the postulated tariff advantage over trucks is flawed because it covers freighting to the inland container depot (ICD) and does not include the additional cost of moving the containers from the ICD to the owners’ premises.

If the tariff advantage over road could be defended, the correct way to measure its economic benefits would be the cost savings, the difference between the “with and without” scenarios. We now know, courtesy of the KIPPRA study, that the actual operational capacity of the railway is 8.76 million tonnes. If we assume, heroically, trains operating at full capacity for the 25 years used in CRBC’s feasibility study and the maximum cost saving ($0.037 a ton per kilometre) we obtain an
Internal Rate of Return of 2.4 percent, against a standard benchmark opportunity cost of capital for development projects of 12 percent.

More importantly, the returns are highly sensitive to the railway’s cost advantage over trucking. If we use the lower-bound trucking cost of $0.10 which reduces the cost advantage to $0.017, the project’s Internal Rate of Return (IRR) falls close to zero, the NPV drops to $580 million and the benefit cost ratio (BCR) to 0.2. The IRR is the discount rate at which the NPV of a project is zero and is used to compare a project’s return to the cost of capital. The BCR is simply the benefits over costs and should exceed one for a viable project. A BCR below one means that the project is an economic liability.

The parameters of the feasibility study have already been blown out of the water by exchange rate movements. The 12 US cents trucking tariff used in the study was KSh10.15 in 2012 (at Ksh 84.50 to the dollar). Today KSh 10.15 translates to 10 US cents which as we saw, makes the railway an economic liability. The problem with the SGR is that the bulk of its costs are in foreign currency—indeed, its approved tariffs are dollar-denominated. Trucking has less foreign currency exposure and it is indirect. If the shilling depreciates, the railway loses cost advantage. This is exactly what has happened. As of mid last year, trucks were charging between KSh 70,000 and 90,000 to transport a 40-foot container from Mombasa to Nairobi, which works out to between $0.05 and 0.07 a ton per kilometre compared to the feasibility study’s break-even rate of US$ 0.083.

Over the long haul, currencies adjust to the inflation difference between a country and its trading partners, which for the Kenya shilling translates to depreciating by five percent per year on average. So far the government is relying on coercion to put cargo on the train, even though it is charging what it is calling a discounted tariff. Raising prices is going to be a difficult proposition. We can also expect the prices and operational efficiency of trucks to continue improving, while the railway is stuck with its current locomotives for decades. The price advantage will continue moving in favour of trucking.

With the installed operational capacity of 8.76 million tonnes, interest on its debt which is in the order of US$200 million (KSh 20 billion) translates to 4.6 US cents a ton per kilometre which works out to KSh 45,000 – KSh 60,000 per container. Add operational costs, and it is readily apparent that there is no competitive tariff that would enable the railway to service its debt. Moreover, it is difficult for the railway to operate at full capacity all the time. In effect, the railway will require both coercion and a massive subsidy to stay in business.

We are now compelled to confront the question: what is the economic rationale of establishing a subsidized public monopoly to replace a competitive industry? With cost advantage more or less out of the question, we are left with two arguments. One, that road haulage does not factor in the public costs of building and maintaining roads— including the disproportionate damage that heavy trucks inflict on the roads. The second is that road haulage cannot cope with the projected freight growth, in effect, that the railway line is a necessity, regardless of the cost. Let’s look at each in turn.

The contention that road haulage is implicitly subsidized is simply untrue. Freight trucks do exact a heavy wear and tear toll on the highway, but they also pay their fair share for it. The government is presently collecting KSh 18 per litre of fuel, which translates to Ksh 3,200 per Mombasa-Nairobi trip for a prime mover consuming 180 litres of diesel. Current freight container traffic on the road is at 1.2 million twenty-foot equivalent (TEUs), we are talking fuel levy revenues in the order of KSh 3.5 billion a year. When you add other users, the Mombasa-Nairobi section is generating upwards of KSh 5 billion in fuel levy funds – KSh 10 million per kilometre. It is enough to maintain it. In fact, if the government were to leverage it (i.e. float a bond and pay interest from it), it would be able to finance a phased expansion into a dual carriageway.
What is the economic rationale of establishing a subsidized public monopoly to replace a competitive industry?

The other is that the road would not be able to cope with the growing freight volume and a railway. International evidence suggests otherwise. In the EU for instance, the rail’s share of freight has fallen from 60 percent in the 70s, to just under 20 percent today, despite determined efforts by governments to reverse it. Railways have struggled to offer the flexible logistical requirements of the distributed just-in-time supply chains of a globalized information age. It is, after all, a nineteenth-century technology. Which is why I get rather amused when I hear the building of the “standard gauge” rail (a “standard” established in 1886) being characterized as a giant technological leap into the future.

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