Market Feature not Market Failure

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Observation-Free Theory?

"… I happened to be reading a popular graduate text in quantum physics, as well as a leading graduate text in microeconomics. The physics text began with the anomaly of black body radiation which was inexplicable using the standard tools of electromagnetic theory…. The text continued, page after page, with new anomalies … and new, partially successful models explaining the anomalies. This culminated in about 1925 with Heisenberg's wave mechanics and Schrödinger's equation, which fully unified the field.

By contrast, the graduate microeconomics text, despite its brilliance, did not contain a single fact in the whole thousand page volume (actually, there were two references to facts, both in footnotes)."

--- From: Review by Herb Gintis of *The Origin of Wealth: Evolution, Complexity, and the Radical Remaking of Economics*, by Eric Beinhocker, Harvard Business School Press, 2006. In *Journal of Economic Literature*, XLIV, 2006, 1018-1031.

And I Can't Help Adding …

"Aumann and Adam Brandenburger (1995) provided sufficient conditions for Nash equilibrium, but these can be expected to obtain in only the simplest of situations."

--- loc. cit.

But this is for another day

An Intriguing Observation --- and Asymmetry

"We normally observe specialization in production but diversification in consumption."

--- From: *Price Theory and Applications: Decisions, Markets, and Information*, by Jack Hirshleifer, Amihai Glazer, and David Hirshleifer, Cambridge University Press, 7th edition, 2005, p.449

Implications

This is a very interesting observation to explain

But, here, let's build a model of a simple economic system that incorporates this feature, and see what behavior the model displays

A Simple Game Model

We consider:

- Two firms labeled F_1 and F_2
- Two “employee-consumers” labeled E_1 and E_2
- F_1 decides whether or not to hire E_1 to make its product
- F_2 decides whether or not to hire E_2 to make its product
- The cost of hiring an employee is c
- If E_1 is paid c, then he has a willingness-to-pay of w for F_2’s product
- If E_2 is paid c, then she has a willingness-to-pay of w for F_1’s product

We model the feature via the ‘crossover’ between 1 and 2

The Game Matrix

F_1 \ F_2	*Hire*	*Do not hire*
Hire	$v(F_1) = v(F_2) = -c$ $v(E_1) = v(E_2) = +c$ $v(\{F_1,E_1\}) = v(\{F_2,E_2\}) = 0$ $v(\{F_1,E_2\}) = v(\{F_2,E_1\}) = w$ $v(\{F_1,F_2\}) = v(\{E_1,E_2\}) = 0$ $v(\{F_1,F_2,E_1\}) = v(\{F_1,F_2,E_2\}) = w-c$ $v(\{F_1,E_1,E_2\}) = v(\{F_2,E_1,E_2\}) = w+c$ $v(\{F_1,F_2,E_1,E_2\}) = 2w$	$v(F_1) = -c$, $v(F_2) = 0$ $v(E_1) = +c$, $v(E_2) = 0$ $v(\{F_1,E_1\}) = v(\{F_2,E_2\}) = 0$ $v(\{F_1,E_2\}) = 0$, $v(\{F_2,E_1\}) = 0$ $v(\{F_1,F_2\}) = v(\{E_1,E_2\}) = 0$ $v(\{F_1,F_2,E_1\}) = 0$, $v(\{F_1,F_2,E_2\}) = -c$ $v(\{F_1,E_1,E_2\}) = 0$, $v(\{F_2,E_1,E_2\}) = +c$ $v(\{F_1,F_2,E_1,E_2\}) = 0$
Do not hire	$v(F_1) = 0$, $v(F_2) = -c$ $v(E_1) = 0$, $v(E_2) = +c$ $v(\{F_1,E_1\}) = v(\{F_2,E_2\}) = 0$ $v(\{F_1,E_2\}) = 0$, $v(\{F_2,E_1\}) = 0$ $v(\{F_1,F_2\}) = v(\{E_1,E_2\}) = 0$ $v(\{F_1,F_2,E_1\}) = -c$, $v(\{F_1,F_2,E_2\}) = 0$ $v(\{F_1,E_1,E_2\}) = +c$, $v(\{F_2,E_1,E_2\}) = 0$ $v(\{F_1,F_2,E_1,E_2\}) = 0$	$v(F_1) = v(F_2) = 0$ $v(E_1) = v(E_2) = 0$ $v(\{F_1,E_1\}) = v(\{F_2,E_2\}) = 0$ $v(\{F_1,E_2\}) = v(\{F_2,E_1\}) = 0$ $v(\{F_1,F_2\}) = v(\{E_1,E_2\}) = 0$ $v(\{F_1,F_2,E_1\}) = v(\{F_1,F_2,E_2\}) = 0$ $v(\{F_1,E_1,E_2\}) = v(\{F_2,E_1,E_2\}) = 0$ $v(\{F_1,F_2,E_1,E_2\}) = 0$

Added Values

	F_2: *Hire*	F_2: *Do not hire*
F_1: *Hire*	$AV(F_1) = w - c$ $AV(F_2) = w - c$ $AV(E_1) = w + c$ $AV(E_2) = w + c$	$AV(F_1) = -c$ $AV(F_2) = 0$ $AV(E_1) = +c$ $AV(E_2) = 0$
F_1: *Do not hire*	$AV(F_1) = 0$ $AV(F_2) = -c$ $AV(E_1) = 0$ $AV(E_2) = +c$	$AV(F_1) = 0$ $AV(F_2) = 0$ $AV(E_1) = 0$ $AV(E_2) = 0$

Adding Up

With two players of type E_1 and two players of type E_2, we can satisfy:

$$\sum_{n=1}^{N} AV(n) = v(\{1,\ldots,N\})$$

This is the **Adding Up** condition

It implies that the **Core**, if non-empty, consists of one point, where each player n receives exactly that player's added value $AV(n)$

Payoffs

		F_2: *Hire*	F_2: *Do not hire*
F_1	*Hire*	$w - c, w - c$	$-c, 0$
	Do not hire	$0, -c$	$0, 0$

Three Conditions on a Game

Adding Up:

This effectively says that there are no bargaining issues in the game (or: competition is fully determinate)

No Externality Problems:

This says that there are no externalities --- defined game-theoretically --- in the game

No Coordination Problems:

This effectively says that local maxima of the overall pie are global maxima of the overall pie

These conditions are from Brandenburger and Stuart (2007)

A Game-Theoretic Efficiency Theorem

Under

Adding Up

No Externality Problems

No Coordination Problems

each player has a (weakly) dominant strategy, and, when these strategies are played, the largest overall pie is created (i.e. efficiency is achieved)

See Brandenburger and Stuart (2007)

Notice that, in the game-theoretic framework, we have to rule out interdependencies to get efficiency!

What is the Source of the Possible Inefficiency in Our Model?

Failure of

Adding Up?

No Externality Problems?

No Coordination Problems?

No Coordination Problem

F_1 \ F_2	*Hire*	*Do not hire*
Hire	$v(\{F_1,F_2,E_1,E_2\}) = 2w$	$v(\{F_1,F_2,E_1,E_2\}) = 0$
	$\geq$	$\geq$
Do not hire	$v(\{F_1,F_2,E_1,E_2\}) = 0$	$v(\{F_1,F_2,E_1,E_2\}) = 0$

Externality Problem!

		F_2	
		Hire	*Do not hire*
F_1	*Hire*	$v(\{F_2,E_1,E_2\}) = w + c$	$v(\{F_2,E_1,E_2\}) = +c$
		$\neq$	$\neq$
	Do not hire	$v(\{F_2,E_1,E_2\}) = 0$	$v(\{F_2,E_1,E_2\}) = 0$

Some Implications

Under this view, externalities arise in a fundamental way in an economic system

Externalities are not exceptionalities!

Furthermore, unless we decide to view interdependence (absence of dominant strategies) as exceptional, a ‘presumption’ of economic efficiency is suspect

Individualistic or Cooperative Behavior?

But, is there a ‘loophole’?

The precise statement is about the proposition that individualistic behavior yields market efficiency

What if we imagine a world in which individualistic behavior is not the primitive concept?

Highly Cooperative …

“Students of law, economics, and politics lack the tools to look at their own society with any objectivity. What are they going to compare it with? They rarely, if ever, consult the vast knowledge of human behavior accumulated in anthropology, psychology, biology, or neuroscience. The short answer derived from the latter disciplines is that we are group animals: highly cooperative, sensitive to injustice, sometimes warmongering, but mostly peace loving. A society that ignores these tendencies can’t be optimal. True, we are also incentive-driven animals, focused on status, territory, and food security, so that any society that ignores those tendencies can’t be optimal, either. There is both a social and a selfish side to our species.”

-- Frans de Waal: *The Age of Empathy: Nature’s Lessons for a Kinder Society*, Harmony Books, 2009, pp.4-5

Two Wrongs Making a Right?

Individualistic behavior yields efficiency --- not necessarily so

Individualistic behavior is the right model --- not necessarily so

But, what if we model moves as jointly (“cooperatively”) rather than individually chosen?

Then, efficiency seems ‘more likely’ again

The two errors might (to a certain extent) cancel each other out!

Cultural Differences

"[V]on Neumann answered that he did not like Nash's solution and felt that a cooperative theory made more social sense. Moreover, Nash himself, in an interview with Robert Leonard,[*] admitted that a cultural difference existed between himself and von Neumann and Morgenstern, in that the latter were probably inspired by a more "European" type of social model, while he was influenced by an outlook typical of "American" individualism."

--Giorgio Israel and Ana Millán Gasca: *The World as a Mathematical Game: John von Neumann and Twentieth Century Science*, Birkhäuser, 2009, p.130

*Interview, December II, 1991, Princeton