Rejoinder to Pesendorfer

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CONTINUATION OF THE EXCHANGE BETWEEN COELHO ET AL. AND WOLFGANG PESENDORFER FROM THE DECEMBER 2004 ISSUE OF **EJW.**

Coelho, Klein, and McClure Comment on Pesendorfer (December 2004)
Pesendorfer Reply (December 2004)

THERE ARE SERIOUS FLAWS IN WOLFGANG PESENDORFER'S (2004) Reply to our Comment on his article "Design Innovations and Fashion Cycles" (1995). Here we address several flaws in Pesendorfer's Reply and expand our Comment's critique of his 1995 model.

OCCAM'S RAZOR

Explanations that are simpler relative to competing explanations fulfill the principle of sound science known as Occam's razor. Contrary to the approach of his 1995 artilce, Pesendorfer's 2004 reply sets out the things to be explained straightforwardly.

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Below I list two key aspects of consumer demand for fashion goods that my model seeks to explain:

Consumers pay a premium for fashionable labels, recognizable brands or fashionable designs. This premium cannot be explained by quality differences.

Desirable designs go out of fashion only to be replaced by new desirable designs. Consumer demand for fashion is surprisingly correlated. (456, bold in original)

In Pesendorfer (1995), there are no simple specifications of the things to be explained.[1] The 2004 reply contains significant mismatches with the material in the 1995 article.

In 2004 Pesendorfer makes premiums for "fashion labels, recognizable brands or fashion designs" the (first) thing to be explained; in contrast in 1995 his discussion is in terms of *design*. We noted that Pesendorfer's model is really about more than design. We said: "It is best to think of a 'design' as something like a ticket that lets the buyer enter into interaction with other ticket holders" (CKM 2004, 438). Now, particularly with his examples involving Prada handbags (2004, 456, 459, 462-63), Pesendorfer makes clear that brand is crucial. This was not a concern of the 1995 article. While there is some superficial plausibility in assuming "an established fashion that separates high and low types" (Pesendorfer 2004, 458)—e.g., wide ties this year—that plausibility disappears with the assumption of a monopolistic *brand* that separates high and low types. Prada handbags of recent design may be reliable markers of wealth and chic, but it is an operationally falsifiable assumption that Prada has a monopoly in such matters. There are many chic and expensive brands, and many garments,

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[1] We encourage the reader to see the introduction and conclusion of Pesendorfer (1995). Here we reproduce the abstract: "*A model of fashion cycles is developed in which designs are used as a signaling device in a 'dating game.' A monopolist periodically creates a new design. Over time the price of the design falls as it spreads across the population. Once sufficiently many consumers own the design it is profitable to create a new design and thereby render the old design obsolete. The paper gives conditions under which all consumers would be better off by banning the use of fashion. Competition among designers may lead to less frequent changes in fashion and to higher prices than monopoly.*"

accessories, and items that serve these functions. A theory that depends on the assumption of a monopoly brand in distinction is incorrect.

If the things to be explained are people paying large sums for nylon Prada bags, and Prada periodically innovating its line, there is no need for an elaborate explanation of the Pesendorfer types. According to Pesendorfer (1995, 775), the consumer buys the latest design to signal "her education, entertainment skills, or human capital." Upon that idea he builds a complex model of dyadic matching. But greater simplicity and power are found in other explanations. Sporting the latest Prada handbag may signal one's wealth—not one's human capital, but one's capital. Pesendorfer (2004, 457, 460) admits this simple explanation, but it finds no place in Pesendorfer (1995). It is easy to see that an elaborate model with an upward sloping demand function is not necessary to gain insights into both the pricing of prestige goods and the idea that people signal wealth by displaying an expensive wardrobe.[2] Adam Smith captured the essence of an explanation in two sentences.

> [W]hen, by the improvements in the productive powers of manufacturing art and industry, the expence of any one dress comes to be very moderate, the variety will naturally be very great. The rich not being able to distinguish themselves by the expence of any one dress, will naturally endeavour to do so by the multitude and variety of their dresses. (Smith [1776], 686)

It is relatively easy to see that ostentation, status seeking, and wealth signaling can give rise to fashion cycles.[3] There are many ways to signal wealth, from driving a Jaguar, to wearing a Rolex, to living in an upscale neighborhood, and the existence of these alternatives renders unbelievable Pesendorfer's story about the unobservability of type giving rise to society-wide dyadic matching based upon a single design (1995).

Another simpler explanation exists. People pay extra for Prada, and Prada continues to innovate and promote new handbags, because people

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[2] Kumcu and McClure (2003) offer a simple explanation of prestige-good pricing by a monopolistic firm, and preserve the assumption that demand curves slope downward.

[3] Coelho and McClure (1993) offer a model of fashion cycles driven by a simple adaptive snob-effect on the demand-side. They preserve the assumption that demand curves slope downward, unlike Pesendorfer (1995).

are pleasantly diverted and fascinated by the glamour and glitz of fashion. They buy a new Prada bag to participate in and recreate the pageantry and imagery of fashion.

As for "signaling," aside from signaling wealth, one might say that in displaying a Prada bag women signal, not "education, entertainment skills, or human capital" (Pesendorfer 1995, 775), as much as an interest in fashion. But this is like saying that someone shooting billiards in a billiards hall displays an interest in billiards, and a store displaying a sign "EGGS" displays an interest in selling eggs. If Pesendorfer would respond that that is what he means by signaling "entertainment skills," he should have said so. But then again it would have become transparent that he was belaboring the obvious.

THE *FORCED ASSOCIATION* ISSUE

In our Comment (p. 438, 442), we described Pesendorfer's 1995 matching rule as "forced association." In 2004 Pesendorfer denies forced association, yet describing the matching rule as anything but forced distorts the meaning of words. In his 1995 model suppose high-types ares matched with low-types. In that event it would make perfect sense for the high-types to terminate their relationships and pair up with other high-types that had been mismatched. In the model (1995) that is not possible. In 2004, (456, 462-63) Pesendorfer suggests that such matching is coordinated around the sporting of fashion items, yet the matching process or experience is never described. Suppose that both high and low types are at a social event.and no one has purchased the season's handbag. Consistent with Pesendorfer's matching rule, high types are matched to low types. Each discovers her partner's type and still spends a *significan*t amount of time interacting with the partner. ("Significant" because otherwise it makes no sense to develop a theory of fashion demand based on such interactions.)

An intelligible (if implausible) interpretation of why each of the high-types endures her match with the low-type is that she is compelled to do so. Why else don't the high types walk away as soon as they discover their match is a low-type? If we are to believe that the matches endure on a voluntary basis, we have not been told why. As a way of meeting the technical assumptions of his model, our interpretation of compulsion is a

straightforward way of meeting the model's requirement that high types stay in matches with low types for significant periods.

MISREPRESENTATIONS

Pesendorfer (2004, 456 and 463) suggests that our Comment denies that signaling is involved in fashion activities. This is incorrect—what we pointed out is that a reputation for producing superior, trustworthy garments is ignored in Pesendorfer's 1995 article along with advertising, branding, and other marketing devices. Because we raise these points does not mean we are denying the obvious: that "the demand for fashion is a 'social' phenomenon" (Pesendorfer 2004, 457).

Pesendorfer also misrepresents us when he says: "CKM seem to suggest (441) that in the case where all but one agents use the design, the single non-user should be matched with a random *user* of the design" (2004, 461-62). He then argues against this suggestion in 2004 arguing that such a matching rule would be "unreasonable" if it entailed matches that one party "would *object to*"! (his italics). In our Comment we did not make that suggestion. We merely point out (441) that that rule would be symmetric to what Pesendorfer assumes for the case where only one agent uses the design. That is, we point out that asymmetric assumptions were made without any explanation.

DID WE SUGGEST MORE COMPLEXITY?

Pesendorfer's Reply states that: "the role of models is to isolate the key aspects of the relevant reality . . . focusing attention on essential variables and facilitating analysis." Ignored in this statement is the role of evidence in assessing models. If the "key aspects of the relevant reality" and the "essential variables," are specified in ways that preclude evidentiary assessments, then there is no objective way to determine the model's validity. This may be model-building but it is not science.

There is a particularly egregious misrepresentation of our Comment's key criticisms in Pesendorfer's Reply; he suggests that we were criticizing

his model for being *insufficiently* complex. "Their criticisms often boil down to the assertion that the real world is more complex and that these complications should be reflected in the model" (455). On the contrary we argued that Pesendorfer's model was non-operational because of it was *overly complex*, vague and inconsistent with reality. Even a casual reader of our Comment will know that we did not argue for additional complexity. Instead, we suggested that the model was ascientific and should be scrapped, not further complicated. Indeed, following Donald F. Gordon (1955), we wrote at some length (450-51) about how tenuous complexity tends to compromise empirical meaning or operationalism .[4]

THE 1995 MODEL HOLDS WATER EVEN LESS THAN WE THOUGHT

It has become increasingly clear to us that the model does not hold water at the endpoints of agent space q є [0,1].

The No-Other-User Case (q=1)

Pesendorfer (1995) assumes that if everyone except you buys the design, you are automatically matched with a low-type. We pointed out (441) that this assumption is bizarre but necessary to hold the model together. In the Response, Pesendorfer (2004, 461) says, "The assumption can be justified if there are some low types who are committed to never using the design." Note that the "some low types" are outside the calculus of the model—they are in the periphery—and must be of zero measure, for otherwise they will upset the math (that is, they presumably exist *also* when the measure of agents buying the handbag is strictly less than 1). This kind of justification shows how Pesendorfer hammers the model into place. One might as well add that the assumption *cannot* be justified if there are no such low types; or, if there are some high types who are committed to never

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[4] Gordon's hypothesis is that mathematical complexity tends to compromise operationalism. Incidentally, the Gordon hypothesis is assessed empirically by Coelho and McClure (2005). Their tests strongly support the proposition that mathematical complexity and operationalism are negatively related in economics.

using the design. Pesendorfer then moves on to a second attempt at justifying the assumption: "An alternative would be to assume that a single non-user is not matched and therefore receives a lower payoff than if he were matched with a low type." Why "therefore"? Often, people choose solitude over the company of a boor. Without providing some context, the whole discussion is simply jejune. Pesendorfer just hammers the model into place when needed, and acknowledges the issue only after being called on it.

The No-Other-User Case (q=0)

In our Comment we made some points about the q=0 case, in which no one else buys the handbag and you (a high type) are deciding whether to buy it. Our grasp of this matter has improved since we first wrote up the Comment. We revisit it here.

The issue is this: In the case where no one else is buying and you buy, which of the following happens to you?

1. **Random-match**: You are matched randomly with the remainder of the [0,1] population.

2. **Peripheral-high-type**: You are automatically matched with a high-type who is in the periphery outside the calculus of the model (in a fashion exactly symmetric to peripheral low-types for q=1).

In our Comment we said that what happens is random-match (441). We said that because Pesendorfer explicitly assumes random-match (part (iii) of the matching rule, p. 776). Moreover, Pesendorfer (2004) did not object to our describing the model as invoking random-match at q=0.

However, we said in a footnote (n. 6, p. 443) that under random-match buying the handbag does not increase the probability of being matched with a high-type. Whatever you paid for the handbag was money thrown away. So your willingness to pay $f(0)$ should equal zero, which is contrary to Pesendorfer's expression (4), p. 776. There, Pesendorfer has for $f(0)$ what it would be under the peripheral-high-type assumption. Again, he did not remark on our pointing out the apparent error.

Working under Pesendorfer's stated assumption of random-match, we noted that q=0 must be an equilibrium, giving rise to multiple-equilibria and upsetting the $f(q)$ function. Here is Pesendorfer's response:

> CKM point out that if we simply set a price then there may be multiple demands consistent with this price. This is correct but irrelevant. The producer can pick the price *and* the quantity he chooses to supply. The function f describes

the possible price/quantity choices that are feasible for a (monopoly) producer in the static setting. (Pesendorfer 2004, 462; his italics)

Pesendorfer's remarks have a serious problem. You can pull on a rope, but you cannot push on a rope. That is, the monopolist can eliminate *only* those equilibria that are exterior to his quantity produced. He cannot eliminate those that are interior. He cannot force the quantity demanded. The issue here is q=0, which is interior to all other equilibria and hence, under random-match, cannot be eliminated by the monopolist. The monopolist can set his price and the quantity supplied, but with multiple equilibria at the price he is not able to determine the quantity demanded. Corresponding, *f(q)* is indeterminate and the model collapses.

The obvious way to resolve the problem at q=0 is for Pesendorfer to impose the peripheral-high-type assumption. In that case q=0 is not an equilibrium and his construction can hold water. But then he is resorting to the *ad hoc* assumptions about zero-measure peripheral high-types, and his condition (iii) on p. 776 (which assumes random-match) must be corrected.

It seems that, being called on these issues, Pesendorfer is still deciding how the pieces of his model are hammered into place.

PESENDORFER'S DATUM

In his Response, Pesendorfer (462) refers to "a $665 Prada handbag made of Nylon," and documents the existence of such a handbag by citing a URL. Pesendorfer refers to Prada handbags repeatedly in his Response. We appreciate that Pesendorfer introduces a real-world referent. However, in Pesendorfer's model (1995), the handbags are sold by the producer at carefully chosen prices to induce a certain equilibrium. The $665 Prada handbag identified by Pesendorfer is not sold by Prada, but by Neiman Marcus. The URL given by Pesendorfer is a Neiman Marcus URL. A recent *Wall Street Journal* article (Byron 2004) observes that Neiman Marcus is known as "Needless Markup," because they jack up prices on certain goods, to affect the customer's frame of reference or to cultivate an image of exclusivity. In reality Prada bags are sold by many sources at many prices. Searching "Prada handbag sale" on Google we found voluminous offerings of "bargains," "discounts," and auctions (at eBay). This is not to deny that a

fashionable Prada handbag may signal wealth and an interest in fashion and glamour. We simply wish to point out that Pesendorfer runs into trouble the very moment he tries to connect his story to the real world.

CONCLUDING REMARKS

Scientific theorizing includes the following features: (1) the identification of real-world phenomena that are amendable to better explanation (part of the theorist's job is to show that these phenomena are important enough to merit scientific attention); (2) the development of explanations that are both valid in logic and in assumptions pertinent to the times and places of the phenomena; (3) the demonstration that the explanations developed are worth minding *relative to or in relation to other explanations*. Pesendorfer's (1995) *AER* article does not satisfy all of these requirements. In fact, it does not satisfy any of them.

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