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Foul-weather feminism: an analysis of short-term labour and economic trends

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We find evidence that a net influx of female workers during minor economic shocks has a mediating influence on GDP (r=-0.29102, N=57, p=0.02807 is a typical result), consistent with the monetizing of underpaid child care. We also find evidence for a reverse correlation during a crisis situation (r=0.46345, N=42, p=0.00200), a similar pair of effects involving a net male influx (r=-0.38041, N=44, p=0.01086, for instance), and use the latter to calculate the global gender income gap (between 42% and 60%).

Introduction

In "Feminism and Economics", Berghmann noted a contradiction in the premises behind most economic theories: *Economists make a professional practice of ignoring the fact that people, even those with above-average rational abilities, may have stereotyped attitudes about women, may have false beliefs about women's abilities, may be influenced by tradition or religion, or may be proud of having been born with the superior status of a male, a status they may desire to protect. [In contrast] The rational beings posited by economic theorists are burdened by none of this sexist baggage and are assumed not to undergo the cost and bother of paying attention to irrelevant considerations in deciding whom to hire or buy from or sell to*[1].

This observation has been influential on feminist economic theory. Jochimsen and Knobloch, for one, have used this to propose the existence of a "maintenance economy", or the *"productive and creative (reproductive) activities that are carried out without payment of money"*[2]. They argue that child care forms one of two bases to economic output as it provides the human capital necessary for economic action, yet it is poorly rewarded. Donath concurs on the issue of child care, and adds: *Caring for children and other dependents is still largely a female task, whether paid or unpaid. In most countries, child care is a very poorly paid occupation. Womens continuing responsibility for the direct care of their children (and the associated domestic work) is arguably one of the major sources of womens continuing economic disadvantage relative to men*[3].

Quantifying this hidden economy has proven problematic. Becker in 1981 had attempted this feat, but was criticized by Donalth for failing to provide a consistent model[3]. Yet, in 2006 we find Folbre still offering critiques of all contemporary efforts[4]. The best efforts to date have been time-use surveys, which suffer from self-reporting bias. The lack of solid data may be due to a focus on long-term trends.

Viewing child care through a short-term lens offers a different perspective. The economy consists of a mix of economic family sizes, from two-income two-parent to single-income single-parent families. Single-income two-parent families are sensitive to the health of the economy, however; should economic foul weather arrive, those families may find themselves short on funds and in need of two incomes. As women are the primary care givers in every society,[3] they would be the ones to leave the home for the workforce. This adds another income to the economy,

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as would the hiring of a third-party child care worker, implicitly monetizing something that previously held little economic value. This bears a resemblance to the explicit monetizing of child care in feminist economic theories. Since measures like GDP are based on total income, this "Foul-Weather Feminism" would provide a pseudo-cushioning effect that would cause an increase in GDP during economic foul weather. Countries where caregivers were prevented from entering the workforce would not see this cushioning effect, and their GDP would exhibit more variation.

This new perspective could also help with another area of research. The gendered income gap has been extensively studied since Becker in 1957[5]; the meta-analysis of Weichselbaumer and Winter-Ebmer, for instance, included 263 articles from 63 countries published between the 1960's and 1990's[6]. All of this research looked into long-term trends.

A short-term approach offers a more complete picture. The differing wages and hidden costs means that an increase in the number of women entering the workforce will have a smaller impact than an increase in the number of men. By using a data set which covers all countries, we were able to gather enough samples to estimate the ratio between male income and female income on a global level.

Methods

The World Development Indicators data set from the World Bank provides 1,262 different data series on 214 countries. Of those countries, 120 provided usable data between 1991 and 2010, which should be a sufficient sample size to support or refute Foul-Weather Feminism[7].

We need two key per-country metrics from this data set: a measure of volatility in wealth, and a measure of correlation between women entering the workforce and economic output. These per-country values will be examined for a correlation across all countries. Foul-Weather Feminism predicts there should be one, the aforementioned cushioning effect; countries with a correlation between women entering the workforce and de-trended output should have less wealth volatility than those with no correlation. Wealth and labour shifts should have long-term trends removed, so the predicted short-term effect will remain. We chose a simple linear model for this because large-scale social trends should be approximately linear over the twenty year timespan.

GDP per capita, measured in constant 1999 US PPP Dollars, will be the primary metric used to measure wealth, however, GDP per employed will also be considered. The former will be the default unless noted. The use of constant PPP Dollars also removes the nonlinear effects of inflation.

A simple standard deviation of de-trended GDP is a poor measure of volatility because it is strongly correlated to a nation's wealth ($p \leq 0.000039$, globally, against median GDP). To compensate, we will divide the above standard deviation by the median of yearly raw GDP. This will be called the "Weighted Standard Deviation," or WSD.

The workplace correlation measure will be the Pearson product-moment correlation coefficient of year-to-year female share of overall employment against year-to-year de-trended GDP wealth. It is an indicator of how strongly fluctuations in the workforce trigger or were triggered by fluctuations in GDP. This will be named "Flux" for the abbreviation of "fluctuation." This measure will have a positive value if GDP and female share of the workforce increase simultaneously, a zero value if neither is correlated, and a negative value in the opposite case.

Two subsets of Flux need to be defined. "Female Flux" refers solely to countries which show a negative Flux, while "Male Flux" is for those that show a positive. Both Female and Male Flux will be positive values between zero and one, with the latter representing an exact correlation and the former representing none. This also corrects the non-intuitive sign of generic Flux.

A "small economic shock" is difficult to define, as the causes for downturns can vary greatly both across and within a country. One potential example is the 0.3% shrink of the US economy in 2001, which was unusually mild[8]. However, it is also possible that a lack of available work could outstrip the capacity to monetize child care during a crisis, therefore a net influx of women will instead be correlated with an increased variance in GDP. This may result in a two-tier effect, where strong Flux is caused by a crisis economy and weak Flux indicates a small economic shock.

There are many other potential confounding factors which challenge the hypothesis. If women already occupy a large share of the workforce, this cushioning effect may be weakened. A country's wealth may be the actual cause for Female Flux, as wealthier countries tend to be more feminist. As hinted

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earlier, there could also be a Male Flux effect caused by male children and dependents entering the workforce, or jobs being filled by male immigration or migrant workers. An economy based around fuel and mining will tend to hire more male workers during boom times resulting in an increasing Male Flux. Consequently, this could lead to a false correlation between Flux and WSD.

Flux suffers from a weak flaw. Both a flood of women to the workforce or a fleeing of men from the workforce will result in an increase in female workplace share, however the hypothesis only pertains to a flood of women. To determine which occurred, the "Labour Force Share Flux" or "LFS Flux" will be defined as the correlation of the year-to-year share of the population in the labour pool, against the year-to-year percentage of female share of employment. This number will be negative when men disproportionately enter or leave the workforce, contra the hypothesis.

The final confounder is the transfer of full time to part time work during an economic shock. These categories of work tend to be heavily gendered, and this could translate into a net increase in the female share of the labour force. However, the total amount of income drops in this scenario and thus so will the GDP, contra the hypothesis. If there is a gendered wage gap, this drop will only be larger and the cushioning effect will have to be correspondingly stronger to overcome the effect.

The strength of a country's fuel and mining sectors will be judged by adding together the percentage that either industry contributes to overall exports. Other resource sectors are less prone to a male bias; for instance, agriculture is male-biased in Europe but female-biased in Asia[9]. For that reason, they have been excluded from this analysis.

This data set offers one more number of interest, relating directly to the gendered wage gap. Monetary worth is arbitrary and reflects what we value. If female labour is assigned lesser value than male labour, we would expect a net female influx to have less effect on GDP than a net male influx. We could use this fact to estimate the gendered income gap on a global scale, by fitting a curve symmetric in all but the value weighting of gendered influx. This requires a measure of impact; fortunately, the effect size of the chosen correlation coefficient is equal to its square multiplied by its sign, which provides a suitable metric. This method is only valid for GDP per employee, as we are only concerned with the employed. Statistical significance will be $p<0.05$.

Results and Discussion

Grouping all 120 countries together, we find a small negative correlation between Flux and WSD ($r=-0.147971$) indicating that as Male Flux increases, WSD decreases; however, the result is not significant ($p=0.106773$). This does not contradict the hypothesis since both the effect of an economic crisis and the possibility of female labour being undervalued have not been accounted for. Figure 1 demonstrates that there are more countries demonstrating a Female Flux ($N=71$) than a Male Flux ($N=49$), and the slope changes suggest at least two effects are in play: high Male Flux or a slight Female Flux. A high Female Flux effect may also be present, though weak.

We will partition the data four ways to search of both crisis and cushioning (or beneficial) effects in Male and Female Fluxes. The obvious way is to "fix" one end of each partition and expand the other to search for a significant result. Crisis partitions are fixed at the highest observed Flux values, while beneficial partitions are fixed at zero Flux. However, the effect centered around a slight Female Flux in Figure 1 may indicate differing values for labour by gender; this would cause very small Female Fluxes to be neutral or even support a Male Flux effect. We will thus consider two other partitioning schemes: "Optimal," the most significant partition within the given Flux for each of the crisis and beneficial possibilities; and "Balanced", the largest set of four equally sized partitions where the cushioning partitions achieve significance.

Female partitions are remarkably consistent across the three methods, but Male partitions show some variation, indicating confounding factors on the Male Flux side. Male Benefit partitions seem strongest when they extend into Female Flux, suggesting unequal rewards for labour. Figure 2 illustrates this idea by visually summarizing all possible partitions and demonstrating that the correlation is robust across a wide range of choices. Figure 3 demonstrates individual outlier countries for each partition and GDP type.

While it would be natural to remove low p-value Flux countries from consideration, this would be devastating to Male Benefit partitions. The loss ranges between half the total (from 44 to 19, in

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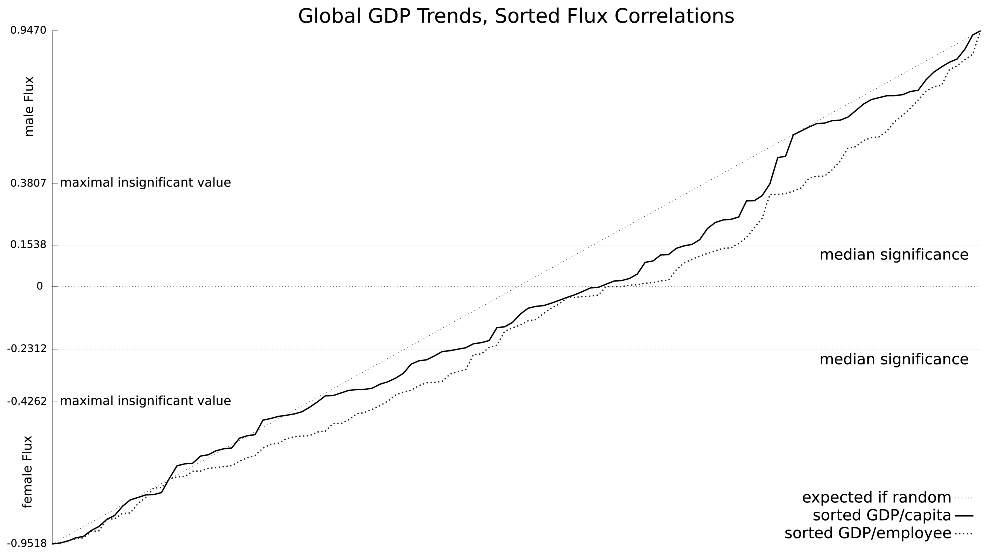

Figure 1:
Sorted correlations between percentage of women employed, verses GDP per employee and GDP per capita. "Median significance" means 50% of the correlations between that line and the X axis have achieved statistical significance. All correlations beyond maximal insignificant value are significant. Flatter slopes indicate clustering.

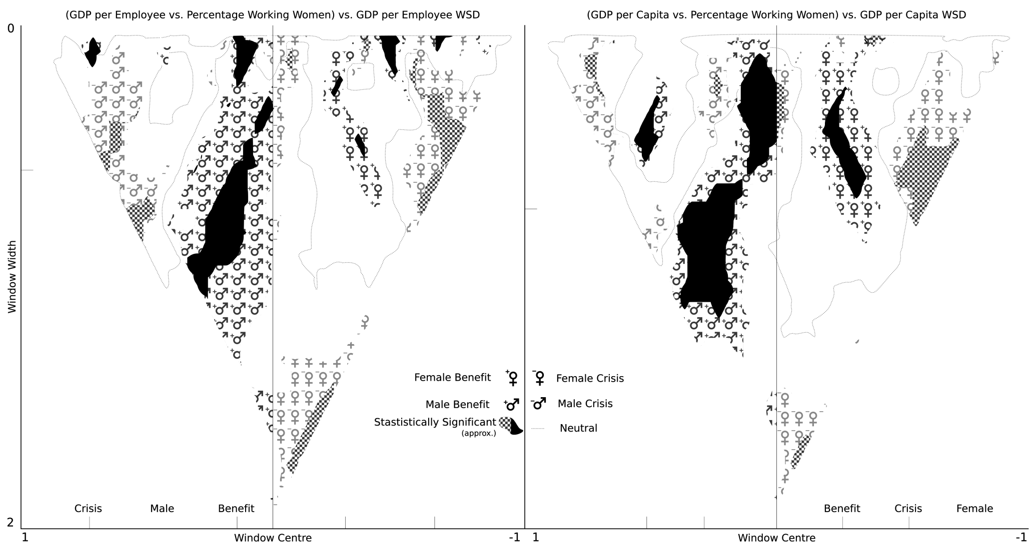

Figure 2:
A comparison of Flux and WSD correlations for various partitions. The original data is a set of disconnected points, so for ease of comprehension they were merged into solid two-dimensional forms. As a consequence, the shapes only approximate the original data. The unmarked axis ticks correspond to the "Balanced" partitions discussed in the paper. Shading is done for clarity only.

Balanced) to nearly all (29 to 4, for Optimal). Female Benefit partitions shrink only by one-third, in comparison. Figure 1 demonstrates no transition in distribution between low p-value and high p-value Flux, however, so it is reasonable to retain both for analysis.

Flux Causes

As to the cause of these fluxes, a straight correlation test between Flux and LFS Flux shows either no significant relation or a non-linear relation. A sign test of the GDP per capita figures, comparing

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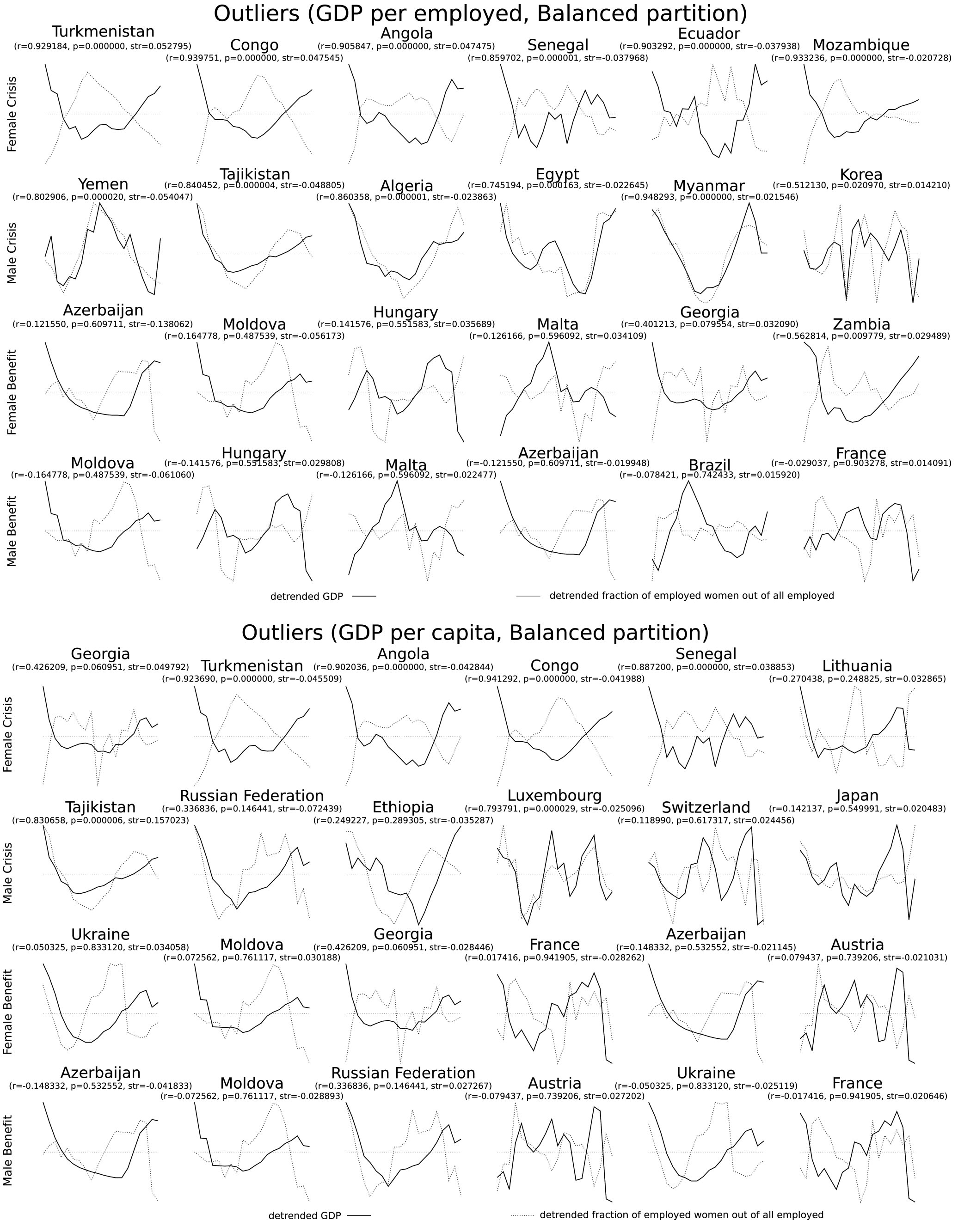

Figure 3:
(TOP): A comparison of the top six outliers within each partition. "r" is the Flux for that country, "p" is the significance, while "str" is how the partition's correlation would change if that country were removed; positive values indicate an increase. (BOTTOM): A comparison of the top six outliers for each partition. Note the non-linear behavior of Turkmenistan. Female Flux correlation signs have been negated to conform to intuition, which expects Female Flux to refer both to women and to a correlation between women occupying a greater share of the workforce.

the expected proportion of women-driven Flux within a partition to the entire population, reaches no significant results (all, excluding Male Benefit partitions, suggest women-driven Flux).

The GDP per employed figures show a clear pattern, in contrast. All female partitions show domination by women-driven Flux, with the exception of one female partition that is

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Table 1: Partitions of correlation (GDP per Capita Flux vs. Variance)								
Fixed	**Female Crisis**		**Female Benefit**		**Male Benefit**		**Male Crisis**	
	-0.95	**-0.21**	**-0.4**	**<0.01**	**0.01**	**0.24**	**0.48**	**0.95**
	r=0.39157, N= 56, p= 0.00284		**r= -0.34810, N= 36, p= 0.03748**		**r=-0.66080, N= 15, p= 0.00732**		**r= 0.38764, N= 26, p= 0.05039**	
Balanced	**Female Crisis**		**Female Benefit**		**Male Benefit**		**Male Crisis**	
	-0.95	**-0.21**	**-0.66**	**0.02**	**-0.15**	**0.62**	**0.1**	**0.83**
	r=0.40748, N=55, p=0.00202		**r=-0.29102, N=57, p=0.02807**		**r=-0.38041, N=44, p=0.01086**		**r= 0.23063, N=39, p=0.15778**	
Optimal	**Female Crisis**		**Female Benefit**		**Male Benefit**		**Male Crisis**	
	-0.95	**-0.21**	**-0.4**	**-0.05**	**-0.15**	**0.25**	**0.48**	**0.83**
	r=0.40748, N= 55, p= 0.00202		**r=- 0.42076, N= 31, p= 0.01842**		**r=-0.54755, N= 29, p= 0.00211**		**r= 0.45631, N= 22, p= 0.03279**	

Table 2: Cause of Correlation (GDP per Employee flux vs. Variance; population women-driven = 77 of 120)								
Fixed	**Female Crisis**		**Female Benefit**		**Male Benefit**		**Male Crisis**	
	32 of 43	**p=0.055958**	**36 of 46**	**p=0.013098**	**2 of 4**	**p=0.118095**	**18 of 34**	**p=0.063388**
Balanced	**Female Crisis**		**Female Benefit**		**Male Benefit**		**Male Crisis**	
	32 of 42	**p=0.033476**	**29 of 36**	**p=0.010031**	**21 of 36**	**p=0.182300**	**12 of 23**	**p=0.080367**
Optimal	**Female Crisis**		**Female Benefit**		**Male Benefit**		**Male Crisis**	
	32 of 42	**p=0.033476**	**26 of 33**	**p=0.022585**	**29 of 51**	**p=0.109695**	**18 of 34**	**p=0.063388**

significantly different from the norm, and all Female Benefit partitions are more women-driven than the corresponding crisis partition. These results are consistent with the hypothesis. Notably, Male Benefit partitions are more women-driven than their Crisis counterparts, though none reach statistical significance.

Table 3 looks for possible correlations within each partition. In addition to the previous data, we will also consider "median Female Share," or the median share of employed women out of all employed over the data set time-frame; "median Unemployment," or the median percentage of unemployment over the time-frame; "median Dependency," or the ratio of the entire population to the employed population; and "median GDP per capita." The correlation and p-value are combined into a "signed-p" value, which is simply p multiplied by the sign of the correlation.

There is weak evidence for a limiting effect because within Female Crisis partitions, the correlations between Female Share and WSD are generally stronger than in Female Benefit partitions. In all cases the correlation is positive (though only Balanced Benefit is significant, at p=0.0411). As further support, the correlation between Female Flux and Female Share is generally negative, but insignificant (best is p=0.1566 for Balanced and Optimal Crisis, though for Optimal Benefit we find a positive correlation).

Female Crisis partitions show a clear correlation between Flux and median GDP, but it is negative; more Flux is associated with a lower median GDP, not more. This is compatible with the hypothesis, but contradicts the claim that influx is positively correlated with GDP. There is a considerable difference between Balanced and Optimal Female Beneficial partitions (p=0.7273, negative correlation, vs. p=0.0475, positive correlation, respectively), though this can be explained by female labour being undervalued; the Balanced Female Benefit partition is forced to to span the same correlation range as the Balanced Male Benefit one, so it must absorb some of the Male Benefit and Female Crisis effects and thus its significance will be diluted. Conversely, we find a consistent negative and significant correlation between median GDP and WSD across all partitions, further contradicting the Flux-GDP claim. No notable correlations exist involving Male Flux partitions.

Fuel/mining exports and all Female Crisis partitions show a strong positive correlation (p=0.00022 is typical), however Female Benefit partitions show little correlation (Optimal with p=0.1057 is the most significant). Increased exports are also significantly correlated with increased WSD across all partitions (p=0.0201 is the least significant), contradicting the alternative hypothesis that exports are the primary cause of cushioning.

The predicted Male Benefit and export correlation varies greatly based on partition (from p=0.9748, positive correlation, to p=0.051, negative correlation), and in most Male Flux partitions, increased exports are significantly associated with increased WSD (the exceptions being Fixed and Optimal Male Crisis, which also correlate with increased WSD but do not reach significance).

Repeating the same analysis for GDP per employed, we find even less evidence for a limiting effect on

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Table 3: Signed-p Correlation Matrix (GDP per capita)									
		Female							
Fixed	Male		Cris Flux	FemShr Md	Fu + Ore	Unemp Md	Dep Md	Md GDP/pop	WSD
		Cris Flux		-0.3210	0.0001	0.9094	-0.6408	-0.0038	0.0028
		FemShr Md	-0.2154		0.0000	-0.9849	-0.0036	0.3521	0.5178
		Fu + Ore	0.1688	-0.0107		0.8324	0.7142	-0.0166	0.0201
		Unemp Md	0.2249	-0.0082	0.0006		0.0000	-0.1306	0.0000
		Dep Md	0.1728	0.0000	0.0013	0.0000		-0.5547	0.2939
		Md GDP/pop	-0.5502	0.6888	-0.5985	-0.3731	0.5975		-0.0113
		WSD	0.0504	0.4074	0.0964	0.0809	-0.7417	-0.0905	
			Bene Flux	FemShr Md	Fu + Ore	Unemp Md	Dep Md	Md GDP/pop	WSD
		Bene Flux		-0.8224	-0.2645	-0.1929	-0.0547	0.1117	-0.0375
		FemShr Md	-0.9931		-0.0003	-0.8148	-0.0965	0.4318	0.1362
		Fu + Ore	-0.3548	0.0952		0.9203	0.4896	-0.0733	0.0085
		Unemp Md	-0.2622	-0.4548	-0.8583		0.0000	-0.1076	0.3954
		Dep Md	0.6049	-0.0352	-0.2726	0.0703		-0.1449	0.5288
		Md GDP/pop	0.6355	-0.9989	0.6449	-0.1477	0.6703		-0.0104
		WSD	-0.0073	0.7207	0.0255	0.0581	0.6523	-0.1816	
Balanced	Male		Cris Flux	FemShr Md	Fu + Ore	Unemp Md	Dep Md	Md GDP/pop	WSD
		Cris Flux		-0.1566	0.0002	0.6494	-0.8960	-0.0060	0.0020
		FemShr Md	-0.5877		0.0000	0.8281	-0.0075	0.2591	0.4965
		Fu + Ore	0.1600	-0.3911		0.6984	0.5703	-0.0223	0.0199
		Unemp Md	0.9690	-0.0185	0.1804		0.0000	-0.0927	0.0000
		Dep Md	-0.9462	0.0000	0.2469	0.0009		-0.4412	0.3002
		Md GDP/pop	-0.3027	0.5595	0.8922	-0.1417	0.3539		-0.0110
		WSD	0.1578	0.2446	0.0254	0.4837	-0.4670	-0.0281	
			Bene Flux	FemShr Md	Fu + Ore	Unemp Md	Dep Md	Md GDP/pop	WSD
		Bene Flux		-0.2304	0.5183	-0.4046	-0.2491	-0.7273	-0.0281
		FemShr Md	-0.2308		-0.0036	0.8173	-0.0326	0.2925	0.0411
		Fu + Ore	-0.9749	-0.1570		0.8339	-0.8453	-0.0195	0.0101
		Unemp Md	-0.4843	-0.0511	-0.9861		0.0000	-0.0625	0.2120
		Dep Md	-0.2113	0.0000	0.3388	0.0000		-0.3072	0.5314
		Md GDP/pop	-0.3699	0.4265	-0.5267	-0.0445	-0.8329		-0.0101
		WSD	-0.0109	0.0538	0.0288	0.7396	-0.9947	-0.0185	
Optimal	Male		Cris Flux	FemShr Md	Fu + Ore	Unemp Md	Dep Md	Md GDP/pop	WSD
		Cris Flux		-0.1566	0.0002	0.6494	-0.8960	-0.0060	0.0020
		FemShr Md	-0.7807		0.0000	0.8281	-0.0075	0.2591	0.4965
		Fu + Ore	0.4434	-0.1200		0.6984	0.5703	-0.0223	0.0199
		Unemp Md	-0.9602	-0.1183	0.0481		0.0000	-0.0927	0.0000
		Dep Md	0.5559	0.0000	0.0526	0.0106		-0.4412	0.3002
		Md GDP/pop	0.7233	0.9861	-0.8696	-0.6300	0.1991		-0.0110
		WSD	0.0328	0.2704	0.1636	0.8326	-0.4112	-0.1488	
			Bene Flux	FemShr Md	Fu + Ore	Unemp Md	Dep Md	Md GDP/pop	WSD
		Bene Flux		0.4945	-0.1057	-0.2133	-0.0742	0.0475	-0.0184
		FemShr Md	0.6457		-0.0005	-0.7608	-0.0775	0.4025	0.1849
		Fu + Ore	-0.0510	-0.2425		0.9504	0.5203	-0.1282	0.0180
		Unemp Md	-0.2127	-0.4464	-0.7421		0.0000	-0.1483	0.4671
		Dep Md	-0.0968	-0.0034	0.8488	0.0000		-0.1754	0.5815
		Md GDP/pop	0.2666	0.9158	-0.4839	-0.0512	-0.5339		-0.0267
		WSD	-0.0021	0.1228	0.0139	0.7264	0.9222	-0.0140	

Female Flux; no significant correlations between Female Flux and exports, but a strong positive correlation between exports and WSD; even less correlation between Female Benefit Flux and median GDP per employed, and no correlation between Female Share and GDP per employed. The above

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Table 4: Global Gendered Income Gap via best-fit				
Window Size	**Income Ratio**	**Residual**	**Minimal p**	**Maximal p**
0.1916	3.52%	1.6324	0.0001	0.0510
0.2874	77.29%	0.7462	0.0011	0.0797
0.3832	52.08%	0.1351	0.0082	0.0595
0.4790	54.01%	0.2026	0.0046	0.0325
0.5747	42.00%	0.1269	0.0020	0.0326
0.6705	58.30%	0.0605	0.0111	0.0533
0.7663	59.96%	0.0999	0.0080	0.1181
0.8621	53.85%	0.1771	0.0126	0.2375
0.9579	3.76%	0.1397	0.0279	0.3749
(Minimal p = the lowest p-value of the four Balanced partitions for that partition size)				

$$f(a_m, a_f, \sigma_b, \sigma_c, \mu_b, \mu_c, x) = -g(a_m, \sigma_c, -\mu_c, x) + g(a_m, \sigma_b, -\mu_b, x) - g(a_f, \sigma_b, \mu_b, x) + g(a_f, \sigma_c, \mu_c, x),$$

$$\text{where} \begin{cases} a_m = \text{amplitude of male contribution}, \\ a_f = \text{amplitude of female contribution}, \\ \sigma_b = \text{standard deviation of beneficial effect}, \\ \sigma_c = \text{standard deviation of crisis effect}, \\ \mu_b = \text{mean of beneficial effect}, \\ \mu_c = \text{mean of crisis effect}, \\ g(a, \sigma, \mu, x) = \dfrac{a}{\sigma\sqrt{2\pi}} \cdot e^{\left(\frac{\mu - x}{2\sigma}\right)^2} \end{cases}$$

Figure 4:
The equation used to curve-fit sliding-window partitions.

conclusions remain valid, if not stronger.

Global Gendered Income Gap

The curve used to estimate the global gendered income gap combines four Gaussian distributions via six parameters; see Figure 4.

The data to be fitted will consist of a sliding window correlation between GDP per employment Flux and WSD. Two candidates will be evaluated for window size: the Balanced partition size (by definition, it is consistent across all sizes) and the partition with the least residual. The latter may amount to fitting the data to suit the model, and should be treated as less reliable. As both Fixed and Optimal partitions have variable sizes, they will not be considered.

The least residual fitting suggests women earn 58% of men (af = 0.0343, am = 0.0589), though the choice of correlation window (r ± 0.3353) forces Beneficial Female Flux just outside significance (p=0.053). This ratio seems unreasonably high, as Canada has a gendered income gap of 68% yet is a feminist-friendly country[10]. The fitting for the Balanced partition size indicates the global gender income gap is 42% (af = 0.0193, am = 0.0459), and the residual is the third smallest of the eleven windows. It is an outlier in terms of value because the other reasonable values range from 60% to 52%. Figure 5 presents a graph of the Balanced partition fit.

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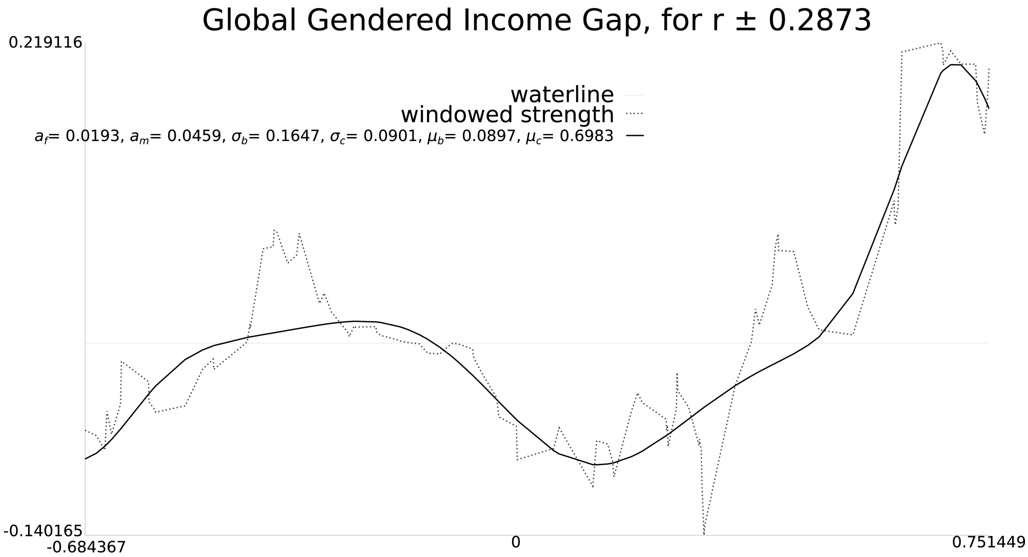

Figure 5:
Best-fit curve for the Balanced partition window. Note the bulge around r = -0.364; countries around that area include the USA, Mali, Mexico, Sweden, the United Arab Emirates, Iraq, and Georgia. Note more variation within windows corresponding to Male Benefit partitions than those corresponding to Female Benefit partitions.

Conclusion

Having analyzed the World Bank data set, we can conclude the following:

- There is a significant correlation between increased small-scale female mobility in the workplace and a cushioning effect on GDP, which is compatible with Foul-Weather Feminism.
- The alternative hypothesis that this is due to male flight from the workforce is refuted.
- The alternative hypothesis that this is due to a cross-correlation with a country's GDP is refuted.
- The alternative hypothesis that this is due to a correlation between fuel or mining exports and Male Flux is refuted.
- There is a significant correlation between increased large-scale female mobility and increased variation in GDP, which is compatible with a crisis economy, as well as other signs of a ceiling effect for the cushioning of small-scale female mobility.
- There are matching correlations between male workforce mobility and variation in GDP.
- There is an imbalance between male and female effects on the economy, consistent with an undervalue of female labour.

Future Work

In future, we would like to examine Male Flux and determine what factors contribute to it. The non-employed population may play some role; the Male Flux side of Figure 2, for instance, shows more change between GDP per employee and GDP per capita than the Female Flux side. There is also a significant negative correlation between median Unemployment and median Female Share of the workforce in Balanced Male Flux partitions, though it is absent for Optimal ones.

We would also like to extend this short-term analysis to the wage gap. Those figures would be more difficult to obtain, but would provide another way to evaluate Becker's theory of minority group pay, specifically that competition in the workforce leads to a decreased wage gap[1].

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